DYNAMICS OF ORGANIZATIONAL ROUTINES IN DECLINING FIRMS WHEN COMPARED TO THEIR MATCHED SURVIVORS: IN THE US CHEMICAL AND ALLIED PRODUCTS INDUSTRY (SIC 2800)

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ABSTRACT

Mahua Guha: Dynamics of organizational routines in declining firms when compared to their matched survivors: In the US Chemical and allied products industry (SIC 2800)
(Under the direction of Hugh O'Neill)

How does organizational decline affect organizational search routines? Do search routines change differently in declining firms than in surviving firms? This dissertation compares the propositions of threat rigidity theory and behavioral theory of the firm to examine if declining firms exhibit rigidity or adaptive behavior in terms of their search routines. It measures search routines by research and development expenditure and by patent counts. It examines the role of the following contingencies: time to bankruptcy, organizational slack and the interaction of organizational slack with time.

Results indicate that declining firms in the US chemical and allied products industry exhibit rigidity in their organizational search routines. Interestingly, the time to bankruptcy did not matter. This dissertation shows that declining firms did not change their year to year search routines in the five years preceding bankruptcy. The results also indicate that both declining firms and their matched surviving counterparts increase search in the presence of available slack and potential slack. Both declining firms and surviving firms use available slack and potential slack during the early years of the decline to enhance search.

Overall, there are two interesting contributions of this dissertation. First, it questions the dominant wisdom in the literature that organizational decline is associated with continued

and accelerated deterioration within firms. Surprisingly, the search routines did not continue deteriorating during the last five years before bankruptcy. Second, organizational search routines are dynamic routines that are supposed to change. However, in this dissertation, these dynamic routines exhibit no change in the five years before bankruptcy. This stimulates further research thought on under what conditions do dynamic routines change and under what conditions do dynamic routines remain stable.

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CHAPTER 1: INTRODUCTION

Are failed firms different than surviving firms? As the process of failure unfolds over time, failed firms may behave differently than survivors. If this is true, the cause of failure might rest in the different behavior. However, failed firms may behave in ways similar to surviving firms. In this instance, interpretations about the causes of failure become more complicated. While failed and failing firm have been studied from a financial perspective and a managerial perspective, scholars on organizational decline have not directly examined specific organizational routines within declining firms. The financial and managerial perspectives tend to explicitly assume that routines are malleable, or subject to management control. In contrast, the routines literature is less encumbered by assumptions of direct managerial control. In this study, I link literature on organizational decline and organizational routines in an attempt to develop increased understanding of the behaviors and issues relevant to firm decline.

Several issues related to declining firms, such as, predictions about bankruptcy (Altman, 1968; Ohlson, 1980), causes of decline (Argenti, 1976; Cameron, Sutton and Whetten, 1988), and behaviors during a period of decline (Latham and Braun, 2009; Nelson, 1981) have been examined. Among the behaviors during decline, some scholars found evidence of adaptive responses (Ketchen and Palmer, 1999; Zajac and Kraatz, 1993) while some others found evidence of dysfunctional behavior (Cameron, Whetten and Kim, 1987; Cameron, Kim and Whetten, 1987; D'Aunno and Sutton, 1992). In comparing failed firms to survivors, some researchers found differences between the two groups, while others found

similarities (Khanna and Poulsen, 1995). In this study, I focus on organizational routines. I examine how search routines within declining firms change or not change in the five years prior to bankruptcy when compared with those within surviving firms that are similar. I also examine changes in the routines across time for failed firms. I relate contextual factors that might influence perceptions of stress with the patterns of change in routines. I examine declining firms in the US SIC[1] 2800: Chemical and allied products industry. I draw on two key theories: threat rigidity theory (a theory drawn from psychology) and the behavioral theory of a firm (a theory developed in economics), to empirically examine the changes in the search routines of declining firms with respect to those of surviving firms and across time.

The chapter unfolds in four steps. Initially, I discuss briefly about the current scholarship on organizational decline, and then on organizational routines. Next, I connect these two bodies of literature and discuss my main theoretical model. Finally, I discuss why I think this research is important.

1.1 Organizational decline

Organizational decline has been widely studied since the late 1970s (e.g. Argenti, 1976; Rubin, 1979; Whetten, 1980). Along with scholars of strategic management and organizational theory, scholars in the allied fields of accounting (Beaver, 1966, Ohlson, 1980) and finance (Altman, 1968; Altman, 1984) have also examined organizational decline. Within strategic management, two main theoretical perspectives that have been used to study organizational decline are: threat rigidity theory (Staw, Sandelands and Dutton, 1981) and

[1] SIC stands for Standard Industrial Classification.

the behavioral theory of a firm (Cyert and March, 1963). A third perspective, prospect theory (Kahneman and Tversky, 1979) addresses similar issues. These theoretical lenses predict and find evidence of different responses (adaptive or rigid) within declining firms.

Threat rigidity theory (Staw, Sandelands and Dutton, 1981) suggests that declining firms become rigid. Rigidity inhibits innovation (Cameron, Whetten and Kim, 1987), strategic change (D'Aveni, 1989a), risky initiatives (Greenhalgh, 1983) and domain change (D'Aveni, 1989a). Hence, threat rigidity theory paints a conservative picture of declining firms. In contrast, the behavioral theory of the firm suggests that declining firms enhance innovation, risk-taking and strategic change activities in order to survive. The behavioral theory asserts that boundedly rational decision makers within declining firms cater to the immediate goal of firm survival by adapting the firms' strategies to the declining conditions. Since the declining performance of these firms fall below their aspiration levels, decision makers foster innovation (Morrow, Sirmon, Hitt and Holcomb, 2007) and become risk-seeking (Bromiley, 1991). Therefore, behavioral theory suggests that managers within declining firms proactively engage in change initiatives in the hope of reviving their firms. Prospect theory (Kahneman and Tversky, 1979) also suggests that declining firms adapt.

The theories disagree, and the evidence is inconclusive. Does decline promote or inhibit adaptive change, innovation and risk-taking? Are there specific contingencies that direct the behavior of declining firms? An explanation for the varying responses to decline might be found at the level of organizational routines. Behavioral theories build on the assumption of a powerful unitary actor: the manager. What if the manager's zone of action is constrained by organizational routines? Put differently, when might routines constrain the manager's actions?

1.2 Organizational routines and their modifications

Organizations have been described as repositories of routines (Nelson and Winter, 1982). Three main schools define routines a bit differently. Routines are described as behavioral regularities. Scholars (Becker, 2005b; Cohen and Bacdayan, 1994; Feldman and Pentland, 2003; Felin and Foss, 2011; Winter, 1964) focus on studying the recurring action patterns that are expressed in organizational routines. Second, routines are defined as physical technology. Scholars in this perspective (March and Simon, 1958:142; Massimo Egidi in Cohen, Burkhart, Dosi, Egidi, Marengo, Warglien and Winter, 1996:686; Nelson, 2009; Nelson and Winter, 1982:92) treat organizational routines as computer programs. According to them, routines are a set of condition-action rules. Routines involve the processing of inputs to develop outputs. The third school asserts that routines are dispositions. This third group of scholars (Hodgson, 2003; Hodgson, 2009; Hodgson and Knudsen, 2010:141) considers routines to be dispositions to behave in specific patterned ways when stimulated by the same kinds of inputs. Across all schools, routines shape behavior.

Here I follow the second group of scholars and define organizational routines as activities that require particular inputs and equipment, in order to produce a product or a service that involves particular inputs and equipment. Scientific and technological understanding guides the organizational routines (Nelson, 2009). Here, I adopt this definition because I do not directly observe the motivation of the multiple actors of the routine. Instead, I assume that behaviors are the consequences of mental models of the routine actors (Egidi in Cohen et al., 1996:686). I plan to consider the search routine as a black-box and examine its inputs and a few chosen characteristics. For the purpose of this study, I define a search

routine as a dynamic routine that enables change in organizational routines (Dosi, Teece and Winter, 1992). A search routine involves a meta-routine (Adler, Goldoftas and Levine, 1999; Grant, 1996) that enables change in operating routines by suggesting alternative solutions that are improvements on the existing solutions (Cohendet and Llerena, 2003:275). This search is guided by "boundedly rational" organizational members (Cyert and March, 1963).

Interestingly, Nelson (2009) pointed out that the "routines as behavioral regularities" and "routines as physical technology" views are often complementary. He cites the examples of the lean production system in Toyota and the Ford mass production routine where both the definitions ("routines as behavioral regularities" and "routines as physical technology") are applicable. This is because the Toyota and Ford automobile production routines include tight links between machinery, job specifications and mechanisms for coordination. I indirectly adopt the "routines as recurrent behavioral patterns" definition when I build the arguments for hypotheses.

In Chapter 5, I review existing studies on organizational routines. However, I find that the following key unresolved issues remain in the existing literature on organizational routines. Are organizational routines stable or changing? Under what conditions do organizational routines change? Under what conditions are organizational routines stable? What types of change (e.g. expansion and shrinkage) of organizational routines occurs? How does organizational decline affect organizational routines? This last question identifies the gap in the combined body of literature on organizational routines and organizational decline. This is the gap that I address in this study.

In discussing the potential for change in routines, Winter (1964:263) suggested that an organizational routine is a "pattern of behavior that is followed repeatedly, but is subject to change if conditions change". Several empirical studies found that routines are not inert and typically change over time (Adler, Goldoftas and Levine, 1999; Feldman, 2000; Feldman, 2003; Narduzzo, Rocco and Warglien, 2000; Pentland and Rueter, 1994). Organizational routines change mainly through any of the following mechanisms: selection, learning and ad-hoc problem solving. I briefly discuss each of these mechanisms in the next few paragraphs and their relevance for this study.

Selection mechanisms work on the whole set of organizational routines that are available within a firm. The routines that are rejected by selection mechanisms are not likely to recur. In contrast, the routines that are selected by selection mechanisms are retained and employed by the firms. These selection mechanisms can be external or internal or a combination of them. Market forces (Zollo and Winter, 2002:344) often act as external selection mechanisms. For example, when the market for photography was moving from analog to digital, the routines related to the analog photography products and services contracted (i.e. shrunk) in many photo companies (Tripsas and Gavetti, 2000). This is because the external selection mechanism of the market did not favor analog photography products any more. A few internal selection mechanisms are economic costs of carrying out the routine (Nelson and Winter, 1982:122), lapses in controlling the routine by managers (Becker, Lazaric, Nelson and Winter, 2005:779; Cohen et al., 1996:672) and the instability of organizational and individual goals (March, 1994). For example, an organizational routine shrinks when the cost of carrying out a routine far exceeds the economic benefits from the routine (Nelson and Winter, 1982:122).

Learning in organizational routine happens as a result of feedback regarding outcomes of the routine (Levitt and March, 1988:319). When an organizational routine fails to meet its target, the received feedback either facilitates learning and improvement in the routine or it reduces the chances of using the routine in the future (Cyert and March, 1963). In contrast, when an organizational routine meets its expected target, the received feedback can facilitate further improvement in the current routine. For example, the production routine in a North American truck plant improved as a result of learning when employees trained on the first shift were transferred to the second shift (Epple, Argote and Devadas, 1991).

Ad hoc problem solving occurs as a response to new and relatively unpredictable challenges (Winter, 2003:993). Adoption of new technology within organizations often triggers ad hoc problem solving, which in turn trigger changes in associated organizational routines. For example, hospitals that implemented an innovative technology for cardiac surgery needed to reallocate roles among members involved in the operating room routine. However, hospitals that employed ad-hoc problem solving and did not select separate operating room teams for the new technology implementation failed in successfully using the new technology even after changing their operating room routines (Edmondson, Bohmer and Pisano, 2001).

In this study, I focus on the debate of whether routines promote stability or change by proposing if and when firm decline is likely to change search routines. Ex ante, I may not know if the change is due to selection, learning, or ad hoc problem solving. Ex post, I will know that firms have failed, and therefore demonstrate adverse selection. My research focuses on the firm's responses prior to the selection event (rigidity or learning), and the distinctions (or lack there-of) in responses observed in surviving firms.

1.3 Bridging the two bodies of literature - organizational decline and organizational routines

Do organizations consistently respond to decline by becoming rigid? Do organizations respond to decline by changing and adapting? Do organizations demonstrate both responses? Does the response vary by context or by type of routine?

Strategy theorists who study failing firms tend to consider bankruptcy of firms as driven mainly by external factors (Daily, 1994). In contrast, behavioral theorists look at internal causes, and study the importance and activities of strategic leaders, such as the top management and the board of bankrupt firms (Daily, 1994). Hence, both perspectives try to find out whether managers of bankrupt firms realize the failing conditions early on, what decisions they take, what activities they undertake and what activities other employees undertake under their command, control and supervision. Therefore, they tell a story of decision making efforts of strategic leaders (who are either "boundedly rational" or "rational").

In this study, I develop a contingent model of the change of search routines within declining firms when compared to the change of search routines within matched surviving firms (Refer: Figure 1.1). Drawing upon the threat rigidity theory (Staw, Sandelands and Dutton, 1981) and the behavioral theory of the firm (Cyert and March, 1963), I offer contrasting propositions of reduced search routines or enhanced search routines within declining firms. I also propose that failed firms and surviving firms are likely to vary in their search routines based upon the following contingent factors: (1) annual calendar time; (2) the level of organizational slack (total, available, recoverable and potential slack); and (3) the interaction of organizational slack and the annual calendar time. I create the sample of failing

firms by choosing firms that filed for bankruptcy and then gathering their expenditure histories over the five years prior to bankruptcy. In order to measure the search routines, I focus on the research and development expenditure of each firm and the number of patents filed by each firm in the US Patents and Trademarks Office (USPTO).

In this dissertation, I use the following terms: “failed firms”, “bankrupt firms”, “failing firms” and “declining firms” interchangeably. For the purpose of this study, each of these terms means the same. Further, “absorbed slack” and “recoverable slack” mean the same.

1.4 The main research questions

In this study, I address the following questions:

1. How do failing firms change their search routines when compared with their matched surviving firms? Is this change a function of calendar time?

2. How are the search routines of failing firms and surviving firms affected by the level of organizational slack (total, available, absorbed and potential)?

3. How are the search routines of failing firms and surviving firms affected by the interaction of the level of organizational slack (total, available, absorbed and potential) and annual calendar time? Even after controlling for these interaction effects, do the search routines of failing firms differ from the search routines of matched surviving firms?

1.5 The focal industry

The sample firms in the dataset are from the Chemical and allied products industry (two-digit SIC of 2800). At the four-digit SIC level, this dataset includes firms from multiple industries. Forty percent of the firms are from Pharmaceutical preparations (SIC 2834). More than twenty two percent of the firms are from Biological Products, Except Diagnostic Substances (SIC 2836). The rest of the firms are from Diagnostic substances (SIC 2835), Plastic materials, synthetic resins, synthetic rubber, cellulose, and other manmade fibers, except glass (SIC 2820), Soap, detergents, cleaning preparations, perfumes, cosmetics, and other toilet preparations (SIC 2840), Industrial inorganic chemicals (SIC 2810), Industrial organic chemicals (SIC 2860) and Miscellaneous chemical products (SIC 2890). The failing firms in this dataset file for bankruptcy between 2001 and 2011.

1.6 The novelty of this study

This study is one of the first to directly examine search routines within declining firms. McKinley (1993) has pointed out that there is a dearth of dynamic models of the internal dynamics of failing firms. I cater to this gap by examining how the search routines (which may contribute to the presence or absence of dynamic behavior in the firm) of declining firms change with the passage of time towards bankruptcy. Further, I examine how the amounts of organizational slack interact with the passage of time to affect the search routines of declining as well as surviving firms. To date, very few studies (D'Aveni, 1989a; Hambrick and D'Aveni, 1988) have examined the contingent role of time in declining firms. Out of these two studies, only one (Hambrick and D'Aveni, 1988) examined how domain initiatives change in declining firms and their matched surviving firms with respect to annual calendar time. The second study (D'Aveni, 1989a) identified patterns of decline with respect

to annual calendar time. D'Aveni (1989a) found that not all firms have the same pace of deterioration of their financial performance with respect to annual calendar time. These studies hint at the variety of responses that exist in declining firms, and how these responses might change across time. In turn, this study will show how patterns of change in search routines contribute to this variance.

Additionally, prior scholars have also not examined the effect of organizational slack on the change of search routines in failing firms. However, scholars have found contradictory evidences of the effect of slack on phenomena that are similar to search routines, such as, change initiatives, innovation and risk taking. Some researchers found a positive and linear relationship between slack and change initiatives (Barker and Duhaime, 1997), slack and innovation (Mone, McKinley and Barker, 1998) and slack and risk taking (Audia and Greve, 2006). A second set of scholars reported a negative linear relationship between slack and change initiatives (Cheng and Kesner, 1997) and slack and innovation (Latham and Braun, 2009). And yet a third research group reported an inverted U-shaped relationship between slack and innovation (Geiger and Cashen, 2002; Nohria and Gulati, 1996) and slack and risk taking (Martinez and Artz, 2006). These varied patterns, I suggest, will be related to time and context differences across declining firms.

1.7 Why is this study interesting and important?

This study is interesting because it challenges the dominant wisdom in the existing literature. Decline is associated as a negative phenomenon within the strategic management literature. This sentiment is portrayed by strategic management scholars when they discuss how organizational decline promotes rigidity within firms (Staw, Sandelands and Dutton, 1981). However, some scholars have found that organizational decline shakes up firms in

many ways. Under declining conditions, firms take risks that they would not take under profitable conditions (Bromiley, 1991; Singh, 1986). Declining firms also undertake innovative activities (Cameron, 1983; Koberg, 1987) and adapt to the changing conditions (Boeker, 1997; Cameron and Zammuto, 1983). Therefore, declining conditions may trigger adaptive responses in some firms and dysfunctional responses in some other firms. Each of the stories of risk-taking, innovation and adaptation within the context of declining firms, is likely to have a background story about organizational search routines.

Interestingly, modification of search routines might be observed within both groups of firms: declining and surviving. Organizational decline need not always be highly correlated with shrinkage of organizational routines. Both declining and surviving firms may shrink as well as expand their routines. This potential finding challenges the traditional wisdom that routine shrinkage is associated with organizational decline and routine expansion is associated with organizational success (Nelson and Winter, 1982).

Barley (2006) has noted that studies that are interesting need not be important. Interesting studies are important, though, if they contribute to increased understanding of an important phenomena. In the organizational routine literature, prior scholars have studied higher-level routines such as meta-routines (Adler, Goldoftas and Levine, 1999; Grant, 1996; Peng, Schroeder and Shah, 2008; Zollo and Winter, 2002). But, none of these scholars have studied higher-level routines in the context of failing or declining firms. In fact, there is a dearth of empirical studies on the evolution of organizational routines in failing firms. Here, I address this gap in the existing literature. I focus on the evolution of search routines because they are suitable candidates for studying change (or its absence) in routines in failing firms. In addition, the modification of search routines that I examine within failing firms and

surviving firms are also likely to indicate micro-level phenomena related to routines, such as: routine expansion (e.g. when there is an increase in a routine), routine contraction (e.g. when there is a decrease in a routine) and routine death (e.g. when a routine is halted). As prior scholars (Lewin, Massini and Peeters, 2011; Zbaracki and Bergen, 2010) have noted, very few studies have focused on micro-level phenomena related to organizational routines. Here, I cater to this gap in the literature on organizational routines.

1.8 The limitations of this study

The main limitation of this study is that the major part of the work is based on secondary data on the outcomes of routines. Therefore, this study mainly considers "routines as a black-box" (Pentland and Feldman, 2005) in order to conduct an empirical analysis based on secondary data. This somewhat reduces the possibility of rich and fine grained analysis (Becker, Lazaric, Nelson and Winter, 2005). The "routines as a black-box" approach also inhibits understanding of the internal structure of processes that transform inputs into outputs and may result in a narrow understanding of the research phenomenon (Pentland and Feldman, 2005: 793,801).

Further, this study examines the change (or lack of change) in higher-level organizational routines. According to Nelson and Winter (1982), out of the three varieties of routines: operating routines, investment routines and search routines; search routines are the higher-level routines that bring change in operating level routines. Change in search routines then may be necessary, but not sufficient, to explain failure in firms. In the future, researchers can examine the role of operating level routines or investment level routines within declining firms.

In addition, in this study I consider only a few of the contingent factors that affect the changes of search routines in failing firms. The contingent factors are: the amount of organizational slack (all three types of slack: available, absorbed and potential), time (annual calendar time) and the interaction of organizational slack and the annual calendar time. Future studies can consider other important contingent factors that alter the fate of search routines in failing firms, such as the ecology of competition and the patterns of exogenous shocks.

Last but not least, I consider the change in the direction and magnitude of research and development (R&D) expenditure and the count of patents filed in the US Patent and Trademarks Office (USPTO). At a later date, scholars can examine other dimensions of routine modification, such as, changes in the number of sites where the routine is conducted, the total amount of time taken to complete the routine, and the quality of the routine.

CHAPTER 2: ORGANIZATIONAL DECLINE: KEY THEORETICAL PERSPECTIVES

A wide variety of scholars have studied organizational decline. The key aspects of organizational decline that these scholars have studied include the causes of decline, the conditions under which decline unfolds and the consequences of decline. In this chapter, I review a subset of this literature. My choice of this subset of literature is dictated by this study's focus on the dynamics of organizational routines within firms that went bankrupt. The study period is the pre-bankruptcy period. I review those studies that examined the internal processes of failing firms. A majority of these studies investigate the consequences of decline. However, a few studies also discuss the conditions of decline.

The chapter is organized as follows. I discuss definitions of organizational decline. Next, I discuss the three main theoretical perspectives adopted in studying organizational decline. For each of these theoretical perspectives, I cite theoretical and empirical examples from prior studies on profit-making business organizations, public organizations and universities (private as well as public). I also discuss normative literature on organizational decline. Then, I discuss the common themes and the conflicting issues that remain across the three theoretical perspectives on organizational decline. Finally, I identify the gap in the literature on organizational decline that I intend to fill in this study.

2.1 Defining decline: Many definitions, three key perspectives

There is no consensus on a definition of organizational decline (Cameron, Sutton and Whetten, 1988). Organizational decline has been categorized into the following five: "decline-as-stagnation" (Whetten, 1980), "decline-as-crisis" (Nystrom and Starbuck, 1984), "decline-as-cutback" (Whetten, 1980), decline as misfit with the internal or the external environment (Miles and Snow, 1994) and decline as "a stage in the organization's life cycle" (Mintzberg, 1984).

The "decline-as-stagnation" definition is especially suited for mature firms that become passive, bureaucratic and show a decrease in the rate of increase of income (Whetten, 1980). The "decline-as-crisis" (Levy, 1986; Nystrom and Starbuck, 1984) perspective proposes that top managers within failing firms initially fail to perceive that crises are developing. Eventually, when top managers notice the problems, they adopt weathering-the-storm strategies, such as postponing investments, reducing maintenance, and halting training. Adopted for the wrong reasons or too late, such weathering-the-storm strategies do not lead to recovery. Then a second phase of crisis occurs. Successful organizational response to crisis in the second phase involves unlearning yesterday's ideas (Nystrom and Starbuck, 1984).

The "decline-as-cutback" suggests that declining firms are those that face continued deterioration when measured in terms of a performance variable, such as: profits (Nelson, 1981; Witteloostuijn, 1998), net income (Moulton and Thomas, 1993), sales (Moulton, Thomas and Pruett, 1996), total assets (Wiseman and Bromiley, 1996), market share (Miller, 1977) and earnings per share (Bolton, 1993) or their combination (Bruton, Oviatt and White, 1994; Daily, 1996; Miller, 1977). Cutback is often defined based on employee counts over

time (Cameron, 1983; Ludwig, 1993). A succinct definition within the "decline-as-cutback" perspective describes decline as "a condition in which a substantial, absolute decrease in an organization's resource base occurs over a specified period of time" (Cameron, Kim and Whetten, 1987:224; Mone, McKinley and Barker, 1998; Whetten, 1981).

Declining firms are those that are misfits with their internal and/or external environments (Greenhalgh, 1983; Miles and Snow, 1994). Weitzel and Jonsson (1989:94) defined declining firms as those that enter a stage of decline when they "fail to anticipate, recognize, avoid, neutralize, or adapt to external or internal pressures that threaten the organization's long-term survival." Decline can be a stage in the lifecycle of a firm (Adizes, 1979; Mintzberg, 1984:213). The decline stage can include different phases or substages. For example, Cameron, Sutton and Whetten (1988) propose that organizational decline consists of two stages. Stage 1 involves deterioration of an organization's adaptation to its domain. Stage 2 involves reduction of resources within the organization.

For some declining firms, the decline is reversed, as firms can successfully turnaround to profitable conditions (Barker and Duhaime, 1997). A second subset of declining firms continue to exist in deteriorating conditions as "permanently failing organizations" (Meyer and Zucker, 1989:19) "whose performance, by any standard, falls short of the expectations of owners, members, and clients, yet whose existence continues, sometimes indefinitely." A third subset of declining firms eventually fail, through bankruptcy (Chapter 7 or 11 of the Bankruptcy Code), acquisition or disbanding.

In this study, my focal interest is on bankrupt firms, with respect to the patterns of search routines in the five year period preceding bankruptcy. Since my focus is on the

consequences of decline (i.e. the effect of decline on the search routines), none of the categories of definitions exactly fit my purpose. The five broad categories of definitions of decline are based on either the cause of decline or on the condition of decline. The following three categories of definitions of decline: "decline-as-crisis" (Nystrom and Starbuck, 1984), "decline-as-cutback" (Whetten, 1980) and "decline-as-misfit-with-environment (internal or external)" (Miles and Snow, 1994) are based on the causes of decline. In contrast, the definitions: "decline-as-stagnation" (Whetten, 1980) and "decline-as-a-stage-in-the-organization's-life-cycle" (Mintzberg, 1984) are based on the conditions of decline. Here, I focus on those firms that finally file for bankruptcy (either a Chapter 11 or a Chapter 7 bankruptcy). And, I define failing firms as those firms that file for bankruptcy (Daily and Dalton, 1994a:1606; Daily, 1996) because of deteriorating financial conditions. My focus is on these failing firms during the period prior to filing for bankruptcy. While reviewing prior studies, I use the terms "declining firms" and "failing firms" interchangeably.

Some firms in my study may file for bankruptcy due to a lack of fit with their environment. For such firms, the "decline-as-misfit-with-environment" definition is relevant. Other firms file for bankruptcy after periods of crises where ineffective top managers could not address the crisis situation. For these firms, the "decline-as-crisis" definition is suitable. However, all of these firms file for bankruptcy due to poor financial conditions. Some bankrupt firms experience fluctuating financial conditions, while others have monotonically declining finances. Those firms that faced continued financial deterioration fit into the definition category "decline-as-cutback" where cutback involves cutback in financial resources.

2.2 Failing firms

Management scholars offer differing perspective about failing firms. The three main theoretical perspectives on organizational decline are threat rigidity theory (Staw, Sandelands and Dutton, 1981), prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) and the behavioral theory of the firm (Cyert and March, 1963). Threat rigidity theory and prospect theory draw mainly from psychology, while the behavioral theory of the firm is based on early scholarship in administrative science and economics (Alchian, 1950; Barnard, 1938; Schumpeter, 1934; Schumpeter, 1942). These three theories draw their ideas from different levels of analyses. Threat rigidity theory, initially based on individual responses to crisis situations, was extended to a multi-level theory that is applicable at the levels of individuals, groups and firms. Prospect theory was mainly proposed as a theory of individual risk taking. In contrast, the behavioral theory of the firm was developed for application at the level of a firm.

Threat rigidity theory (Staw, Sandelands and Dutton, 1981) holds that firms and decision makers within failing firms become rigid. In contrast, both prospect theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992) and the behavioral theory of the firm (Cyert and March, 1963), imply that managers adapt.

Staw, Sandelands and Dutton (1981), early proponents of the threat rigidity theory proposed that individuals, groups and firms faced with the threat of a disruptive change become rigid in their responses. The two main threat rigidity responses are a restriction of information processing, such as a narrowing in the field of attention, and a constriction of control, such as a concentration of power. The implications are that when faced with threat

conditions such as the prospect of failing in the near future, firms are likely to stick to well-learned or dominant responses.

In contrast, Kahneman and Tversky (1979), the proponents of prospect theory, suggested that individuals become more risk-seeking in the face of potential threats and losses. This risk-seeking behavior at the individual level can be applied to decision makers within failing firms. When faced with the threat of firm failure, then, decision makers within failing firms become risk seekers. They then initiate changes within their failing firms.

Similar to prospect theory scholars, the proponents of a behavioral theory of the firm (Cyert and March, 1963) proposed that firms undertake change initiatives based on their expectations and aspirations. Firms have goals, expectations and aspirations. The expectation level of a firm is set by drawing inferences from the environment. The aspiration level of a firm is a weighted function of the firm's past goals, its past performance and the past performance of other comparable firms. Applying the behavioral theory to failing firms, managers within such firms with performance below their aspiration levels should initiate change activities in order to cater to their survival goal, and reach their aspiration levels (Ketchen and Palmer, 1999).

This tension between adaptive change and threat rigidity appears in empirical studies and theoretical work, in samples of both profit and not-for profit organizations. Table 2.1 provides a list of these prior studies. Though the studies cover a period from the 1980s to the 2010s, there is no clear indication that declining firms became more threat rigid or more adaptive. In addition, the indiscriminant patterns of behavior persist in both profit-seeking and not-for-profit organizations.

2.3 Threat rigidity responses within failing firms

The central thesis of the threat rigidity theory is that when faced with threat situations, decision makers will tend to continue with their well-learned responses even when they are inappropriate in the changed environment (Staw, Sandelands and Dutton, 1981:502). The threat rigidity theory predicts that decision makers within declining firms will become rigid in their responses to change. Rigid responses include retaining legacy strategies and/or engaging in incremental reductions. Rigid firms inhibit innovation and avoid risks. In the following paragraphs, I discuss the evidence concerning threat rigidity. Do declining firms undertake change initiatives other than incremental cuts? Do declining firms innovate?

The main types of threat rigidity behavior can best be discussed with the help of the model developed by Sutton and D'Aunno (1989). In their model, decreased financial resources led to three main types of rigid responses within declining organizations: restriction in information processing, constriction of control and conservation of resources. The first type of rigid response (restriction in information processing) was evident in increased used of standard operating procedures. The second type of rigid response (constriction of control) was observed in increased centralization of authority. Finally, the third type of rigid response (conservation of resources) was operationalized through cost cutting and efforts to assure accountability.

What are the specific rigid responses observed within declining firms? In a sample of drug abuse treatment organizations D'Aunno and Sutton (1992) found evidence of threat rigidity responses under financial adversity, as the organizations adhered to existing procedures, reduced workforce, and faced increased conflicts among organizational members. Additionally, when funding sources were reduced these organizations reduced

participative decision making, decreased the workforce, and increased competition among members. Other scholars found evidence of rigid use of existing procedures (D'Aunno and Sutton, 1992), lack of change initiatives (Nelson, 1981), rumor (Sutton and Callahan, 1987), conflict among employees (Sutton and Callahan, 1987), high extent of centralization (Daily and Dalton, 1994b; D'Aveni, 1989a), less participative decision-making (D'Aunno and Sutton, 1992; Sutton and Callahan, 1987) and relationship disengagement (Sutton and Callahan, 1987).

In addition to the above evidence of threat rigidity responses in profit-making business organizations, declining public organizations also showed threat rigidity responses such as a lack of long term planning, and a loss of slack and non-prioritized cuts (Cameron, Whetten and Kim, 1987). Managers within a large non-profit organization that ran anti-poverty programs in the US behaved in self-defeating ways during its decline. They were driven by personal interests, engaged in conflict and accomplished less (Krantz, 1985). Similarly declining colleges and universities showed distinct signs of threat rigidity (Cameron, 1983). Managers in declining universities employed standardized structures, relied on prior conservative practices, focused on internal efficiency and ignored public relations (Cameron, 1983). Interestingly, the negative attributes, such as curtailed innovation, scapegoating, resistance to change, turnover and conflict, predicted to be associated with decline are characteristic of both failing and stagnant higher educational institutions. These attributes were not present under conditions of growth (Cameron, Whetten and Kim, 1987; Cameron, Kim and Whetten, 1987).

In conformance with the threat rigidity hypothesis, declining firms reduced initiatives for change. They engaged in fewer mergers and acquisitions while they liquidated and

divested more subunits (D'Aveni, 1989a). Relative to surviving firms, the top management team characteristics in declining firms deteriorated at an accelerated rate in the five years prior to bankruptcy filing (Hambrick and D'Aveni, 1992). The presence of a shrinking top management team with fewer members experienced in the core functional areas is probably why managers undertook fewer change initiatives within declining firms. Similarly, declining public organizations constrained their domain definition (Bozeman and Slusher, 1979), engaged in cutbacks (Hardy, 1990; Levine, 1979; McKinley, Cheng and Schick, 1986), deferred maintenance (Levine, 1985) and reduced budget across all levels (Levine, 1985). Cutback management is a well discussed phenomenon in the organizational decline literature on public organizations including universities (Levine, 1978; Levine, 1979). Cutback involves shrinking organizational activity in order to consume fewer resources. Cutback management involves making hard decisions about layoffs, downsizing of subunits, terminating programs, and scaling down operations (Levine, 1979).

Do declining firms engage in innovation? In concordance with the threat rigidity predictions, prior scholars found evidence of lack of innovation within failing firms. Latham and Braun (2009) found that failing firms with more managerial ownership and more slack reduced their innovation spending. In a sample of thirteen firms, Nelson (1981) found that in the years immediately prior to bankruptcy, managers within failing firms inhibited innovation. Under severe adversity, failing firms exhibited evidence of counter-productive responses and threat rigid behavior (Nelson, 1981). Lack of innovation is also evident in declining higher educational institutions (Cameron, Kim and Whetten, 1987).

The previous discussions and empirical evidences clearly support the threat rigidity perspective on organizational decline. When organizations face the threat of failure, their

decision makers become threat rigid and show two main types of rigid behavior: restrictive information processing (e.g. reduced number of channels) and constricted control (e.g. concentrated power) (Staw, Sandelands and Dutton, 1981). Hence, according to the threat rigidity perspective, declining organizations undertake no or few change initiatives. The threat rigidity theory also proposes that declining organizations tend to shrink or continue with their existing core domain(s) of expertise, not innovate and show risk aversion.

While threat rigidity is clearly a frequent response to decline, the threat-rigidity literature, at least in its normative implications, implies that it should not be the only response. In addition, organization theorists (Miller and Friesen, 1983) and strategy researchers (D'Aveni, 1989a) suggest that there are different patterns or types of decline. It is not at all obvious that all types of decline would trigger the threat-rigidity pattern. Prospect theory and the behavioral theory of the firm provide this evidence.

2.4 Prospect theory predictions within failing firms

In this section, I discuss findings of prior studies on organizational decline that used a prospect theory perspective. I frame this discussion around similar questions that I had used in organizing the discussion on the threat rigidity perspective. Do managers within declining firms undertake change initiatives? Do managers within declining firms become more risk seeking? Do these managers innovate?

The prospect theory lens proposes that managers will change, they will become risk-seeking, and they will innovate. In keeping with the predictions of prospect theory, managers of failing firms do diversify their product market domains (Boeker, 1997), they do improve processes (Nelson, 1981), and they do change board composition (Boeker and Goodstein,

1991). Relative to the managers of surviving firms, managers of declining firms enter into more board interlocks as they decline (Sheppard, 1994) and invest a greater percentage of sales revenue on advertising (Willard and Cooper, 1985). Khanna and Poulsen (1995) found that managers of declining firms are as capable in taking value enhancing decisions, such as issuing new debt and equity, as are the managers of surviving firms.

Like their counterparts in profit seeking firms, administrators of declining public organizations also exhibit adaptive changes in the face of decline. Koberg (1987) found that when faced with the prospect of decline, school administrators undertook five broad categories of organizational adjustments: procedural, personnel (e.g. eliminating positions for teacher-coordinators), process (e.g. reducing expenditures on textbook repairs), structural (e.g. creating school closure task forces) and strategic (e.g. closing under-enrolled schools).

According to the prospect theory, decision makers within failing firms should expand beyond the core domains of their firms while attempting to improve declining conditions. Khanna and Poulsen (1995) found that managers within declining firms engaged in acquisitions and expansions in the three year period prior to bankruptcy. Miller and Friesen (1983) reported that managers of some declining firms took bold new market entry steps. Nelson (1981) found that decision makers of a failing firm tried to vertically integrate in the hope of cutting costs and reducing dependence on a competitor.

Since failing firms typically have substandard performance, prospect theory predictions regarding risk-taking should fit these firms (Bowman, 1982). As expected, D'Aveni (1989b) found that some firms can delay bankruptcy by undertaking risky initiatives that give creditors the hope that these firms will become dependable in the near future.

Creditors continue to support declining firms as long as these firms have sufficient managerial and financial resources (D'Aveni, 1989b). Hiring practices of declining firms become riskier as managers often hire outside CEOs (Davidson, Worrell and Dutia, 1993), and prestigious top managers (D'Aveni, 1990).

In keeping with the theme of innovation as a prospect theory prediction, some declining firms adopted prospector strategies; i.e. they refocused their product markets, channeled their innovation and had well defined marketing plans (Evans and Green, 2000). Managers of declining firms allowed early adoption of an organizational innovation (Bolton, 1993) by joining a research and development consortium early on. In a sample of organization closings in the public sector and the private sector, Sutton (1983) found that employees constructed new ways of doing things before closure.

The previous paragraphs elaborated the prospect theory perspective on organizational decline. According to this theory, managers within declining firms perceive the threat of bankruptcy in the near future as a situation of potential loss. They then become risk seekers, undertake change initiatives, adapt their key domains of expertise and enhance innovation. Overall, the prospect theory portrays managers within declining firms as active decision makers who are willing to take risks in order to reverse the deteriorating conditions. This theoretical perspective is then, in sharp contrast to the threat rigidity perspective that I have discussed in the previous section.

Both the threat-rigidity perspective and the prospect theory perspective have some supporting evidence in empirical research. For both theories, though, there is evidence that the relationship between decline and either response, rigidity or innovative change, is

complex. Nelson (1981) and Miller and Friesen (1983) argue that there can be too much or too little innovation. Wiseman and Bromiley (1996) report evidence of a cyclical process where decline increases risk seeking, but the risk seeking then aggravates firm decline.

2.5 Behavioral theory predictions within failing firms

In this section, I elaborate on findings from prior studies on organizational decline that employed a behavioral theory lens. In drawing upon a behavioral theory of the firm, Boeker (1997) found that managers within failing firms actively initiated changes. Hambrick and D'Aveni (1988) reported that declining and surviving firms undertook adaptive domain initiatives. The types of changes initiated by declining firms include the addition and deletion of technology (Ketchen and Palmer, 1999), the deletion of services (Ketchen and Palmer, 1999), increases in output (Witteloostuijn, 1998), the addition of personnel (Ford, 1980a) and alliances with other organizations (Cummings, Blumenthal and Griener, 1983). Eighteen (of a total of fifty seven declining firms) even changed their primary industry in the five years prior to filing for bankruptcy (Hambrick and D'Aveni, 1988). Thietart (1988) reported that managers pursued growth to reverse decline, by initiating changes in sales.

The behavioral theory of the firm predicts that failing organizations are likely to expand or shift their core areas of expertise in an effort to revive them. Zajac and Kraatz (1993) confirmed this prediction in an empirical study of all US liberal arts colleges (1971 to 1986). These authors found that the administrators of shrinking colleges launched several change initiatives such as new undergraduate and graduate program, and increased gender diversity in the student body.

Do declining firms innovate? A behavioral theory of the firm predicts that managers within failing firms will innovate in order to improve their chances of survival. In a sample of all single product manufacturing firms from 1982 to 1984, Morrow, Sirmon, Hitt and Holcomb (2007) found that sixty percent of the firms took at least one strategic action, such as strategic alliances, new product introductions and acquisitions, in the year following declining market performance. Those firms that introduced new products improved their investors' expectations.

As is evident now from the discussion in this section on behavioral theory and the prior section on prospect theory, both behavioral theory and prospect theory predict similar adaptive behavior in declining firms. However, the basis of these predictions differs for these two theoretical perspectives. While the behavioral theory predictions are based on the gap between the aspiration level and the declining performance, the prospect theory prediction is based on individual decision maker's risk seeking behavior when faced with the potential loss situation of bankruptcy in the near future. Overall, these two theories predict that managers of declining firms undertake adaptive change initiatives including domain change. They also foster innovation and become risk seekers. While there is empirical evidence for these two theories, the evidence within each perspective is mixed. When viewed in comparison to the threat-rigidity perspective, the number of contradictions in the evidence supports a call for better insights and integration.

2.6 Common themes in different perspectives on organizational decline

Variety is one common theme across this research. In many instances, declining firms exhibit rigidity, as suggested by the threat-rigidity perspective. In like manner, many

declining firms exhibit risk seeking and innovation, as suggested by prospect theory and the behavioral theory of the firm.

A second common theme is the efficacy of each form of response varies. Rigid responses appear to be effective in some instance, ineffective in others. Risk seeking and innovation can improve performance or hurt performance. A guiding theme in this dissertation is the form of response and efficacy of response are each likely to vary across different contexts.

Now, the question remains as to how do we know which declining firms will undertake adaptive change and which ones will become rigid? Also, is it a question of which or when? That is, are some declining firms always likely to exhibit adaptive behavior while some others always likely to exhibit threat rigidity in the face of failure? Or, can the same set of declining firms become either adaptive or rigid depending on certain contingencies? This last question has been addressed by several scholars (Cameron, 1983; Ketchen and Palmer, 1999). I discuss them in detail in the next chapter, which is dedicated to studies that identified contingencies that guide adaptive or rigid behavior within declining firms.

Table 2.2 lists prior studies that have empirically found contradicting evidence of rigid and non-rigid responses to decline.

2.7 The relevance of this review for the central research problem of this study

The unresolved questions in the literature on organizational decline may rely on the relationship between decline and organizational routines. Organizational routines are the building blocks of organizational capabilities (Nelson and Winter, 1982) that direct the

internal processes of firms. An organizational routine is a "pattern of behavior that is followed repeatedly, but is subject to change if conditions change" (Winter, 1964:263).

A suggested research issue is what conditions need to change, and at what rate? An interesting related question would address the relationship between different types of routine, and changing conditions. Different routines may change in different ways and/or at different rates. By focusing on an important routine, that is, the search routine, I hope to unpack some of the contextual conditions that influence the relationship between decline and the firms' response to decline.

CHAPTER 3: ORGANIZATIONAL DECLINE: CONTINGENCY PERSPECTIVES

In the previous chapter, I discussed the three main theoretical perspectives on organizational decline: the threat rigidity theory (Staw, Sandelands and Dutton, 1981), the prospect theory (Kahneman and Tversky, 1979) and the behavioral theory (Cyert and March, 1963). To sum up each of these theoretical perspectives, the prospect theory and the behavioral theory predict adaptive change within declining firms. In contrast, the threat rigidity theory predicts rigidity (i.e. sticking to well-learned responses) within declining firms.

In this chapter, I review studies that offer contingency perspectives on organizational decline, while recognizing the possibility of either rigid or adaptive responses. I focus on internal and external contingencies that guide the responses of declining firms. I concentrate on the following specific contingencies: organizational slack, past firm financial performance and time.

The chapter is organized as follows. At the very beginning of this chapter, first, I discuss the logic that guided the choice of this subset of contingencies. Next, I elaborate on prior empirical evidence of the contingencies. I then elaborate on the few studies that consider the role of time. Finally, I discuss the issues that remain unaddressed and how this study helps to resolve some of these issues.

3.1 The contingencies that affect the behavior of failing firms

Prior scholars have found contingencies that affect the behavior of failing firms which can be categorized as internal or external. Organizational slack (Barker and Duhaime, 1997), firms' past financial performance (Boeker, 1997), and firm size (Wiseman and Bromiley, 1996) are the most important internal contingencies. I focus here on organizational slack and the firms' past financial performance. I include organizational slack because of its prominence in the literature on organizational decline. I also include reviews of the contingency effects of firms' past financial performance on the responses of declining firms. I do so because evaluation of performance is at the heart of the behavioral theory of the firm (Cyert and March, 1963).

I exclude firm size as an internal contingency from consideration in my analysis. While firm size is a relevant variable for decline, I control for firm size in my sample of declining firms and matched surviving firms. For each declining firm in my sample, I choose a matched surviving firm based on multiple criteria out of which firm size is one criterion. I measure firm size in terms of the total number of employees and also in terms of the total sales volume.

Organizational slack is a key variable that affects the responses of declining firms (Hambrick and D'Aveni, 1988; Wiseman and Bromiley, 1996). Organizational slack is "that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment" (Bourgeois, 1981:30). Examples of slack resources are excesses of inventory, personnel, retained earnings and working capital (Cyert and March, 1963; Love and Nohria, 2005).

The behavioral theory of the firm (Cyert and March, 1963) promotes slack as "beneficial" for declining firms. Slack acts as a buffer for the technological core of the firm, especially in times of distress. Slack also stimulates search for new solutions. According to this perspective, more slack resources allow declining firms to initiate suitable change activities (Barker and Duhaime, 1997; D'Aveni, 1989a), increase their risk taking (Audia and Greve, 2006) and enhance innovation (Cameron, 1983; Mone, McKinley and Barker, 1998). In contrast, agency theory scholars promote slack as "inefficient" perspective (Jensen, 1986; Antle and Felingham, 1990; Brush, Bromiley and Hendrickx, 2000). In this view, managers become complacent in the presence of slack. They act towards their own interests rather than towards organizational interests. In tune with the agency theory view, Latham and Braun (2009) found that declining firms with higher levels of slack decreased their innovation spending.

Some scholars bridge the two distinct perspectives on slack and propose an inverted U-shaped relationship between slack and risk-taking (Martinez and Artz, 2006), slack and innovation (Nohria and Gulati, 1996; Geiger and Cashen, 2002), and organizational success and slack (Bourgeois, 1981). They shift the focus from whether high levels or low levels of slack improve firm performance to what is the optimal level of slack that is beneficial. Cheng and Kesner (1997) and Latham and Braun (2008) present a more nuanced view, and argue that the impact of slack depends on the firm's situation and strategy. Based on its relative ease of access, Bourgeois and Singh (1983) identified three different types of slack: available slack, recoverable slack and potential slack. Available slack consists of uncommitted resources that can be put to use immediately. Recoverable slack consists of extra resources that are already absorbed into the organization's system but can be recovered if there is a

need. Potential slack denotes the firm's ability to raise extra resources from the environment through means such as equity capital or debt. Each of the three types of slack have different relationships with: risk-taking (Singh, 1986; Wiseman and Catanach, 1997), innovation (Geiger and Cashen, 2002; Greve, 2003), and change (Miller, Lant, Milliken and Korn, 1996).

While each of these three types of slack affects risk taking, the evidence about the form of the relationship between slack and risk-taking is mixed. With respect to available slack, Singh (1986) and Wiseman and Bromiley (1996) found no relationship. In contrast, Martinez and Artz (2006) found a non-linear relationship. In assessing of recoverable slack, Singh (1986) found a positive relationship with risk taking while Wiseman and Bromiley (1996) uncovered a negative relationship. In an attempt to explain the mixed results for recoverable slack, Wiseman and Catanach (1997) proposed a convex relationship. Potential slack positively influences risk-taking (Wiseman and Bromiley, 1996; Wiseman and Catanach, 1997), though the relationship appears to be non-linear in regulated environments (Martinez and Artz, 2006).

Each type of slack also affects innovation. The results exhibit similar mixed findings. For available slack, Mone, Mckinley and Barker (1998) reported a positive relationship while Geiger and Cashen (2002) found a non-linear relationship. For recoverable slack, both a positive (Greve, 2003) and a non-linear relationship (Geiger and Cashen, 2002) have been presented. Unlike available and recoverable slack, the relationship between potential slack and innovation is consistently reported as positive. Hence, the higher the level of potential slack, the greater is the amount of innovation (Geiger and Cashen, 2002).

Each type of slack also affects the change initiatives within declining firms in two ways. First, more slack facilitates the use of more change initiatives. Second, longer term initiatives are generally linked to recoverable and potential slack, while available slack provides support for quicker, short term initiatives. Table 3.1 summarizes the contingent effects of organizational slack on change initiatives, risk taking and innovation. This table also includes the separate effects of each of the three different kinds of slack (available, recoverable and potential) on change initiatives, innovation and risk-taking.

The second internal contingency of interest is firms' past financial performance. Past high performance is typically associated with complacence, inertia (Audia, Locke and Smith, 2000; Miller and Chen, 1994), less risk taking (Denrell and March, 2001) and fewer changes (Boeker, 1997; Lant and Mezias, 1992). High past performance decreases the likelihood that managers will make any external attributions for any negative performance outcomes (Lant, Milliken and Batra, 1992). In contrast, low past performance increases the likelihood that managers will make external attributions for any negative performance outcomes (Lant, Milliken and Batra, 1992). Following the behavioral theory of the firm (Cyert and March, 1963), expectations and aspirations also play a role in guiding organizational responses especially when past performance is compared to them. Both expectations and aspirations positively affect risk taking (Bromiley, 1991). The difference between aspirations and expectations negatively influences risk taking (Wiseman and Bromiley, 1996).

There are other financial aspects of a firm, such as the level of financial adversity, that play a crucial role in guiding the responses of declining firms. The level of financial adversity guides the use of constructive or dysfunctional changes within declining firms (Nelson, 1981). Firms make few adjustments when their financial adversity is low. Firms

learn positively and undertake adaptive changes when their financial adversity is moderate. Firms hardly take any change activities i.e. they become threat rigid when their financial adversity is high (Nelson, 1981).

Prior scholars have examined a wide range of factors that shape the responses of declining firms. Slack is the predominant factor identified. Cyert and March (1963) theorized that the amount of slack resources in declining firms is crucial because slack buffers the core technologies and processes of firms and stimulates search for suitable solutions. Hence, declining firms with greater levels of slack are likely to be at a relative advantage than declining firms with lower levels of slack. Greater levels of slack allow declining firms to undertake suitable change activities (Barker and Duhaime, 1997; D'Aveni, 1989a), engage in innovation (Cameron, 1983; Mone, McKinley and Barker, 1998) and actively seek risk (Audia and Greve, 2006). In contrast to this behavioral perspective that slack facilitates response to decline, agency theory (Jensen, 1986; Jensen and Meckling, 1976) suggests that the presence of slack promotes conflict among organizational members and also fosters complacence among them. Therefore, according to agency theory, declining firms engage in fewer change initiatives (Latham and Braun, 2008), inhibit innovation (Latham and Braun, 2009) and become risk averse. Interestingly, the contradictory propositions of the role of slack of the two schools: the behavioral theory and the agency theory can be bridged by proposing a non-linear relationship (an inverted U) between slack and change, between slack and innovation (Geiger and Cashen, 2002; Nohria and Gulati, 1996) and between slack and risk (Martinez and Artz, 2006). The relationship is complex as three different kinds of slack (available, recoverable and potential) affect change, innovation and risk differently.

While there are environmental characteristics considered in prior contingency research on organizational decline, I do not review them for this study. Rather, I control for these characteristics by creating a matched sample of bankrupt firms and survivor firms based on their industry, product-market, sales volume and firm size. Therefore, industry level and market level characteristics are already controlled by the design of the sample.

3.2 Time

At present, the role of time in organizational decline is not well specified (Cummings, 1988; Cameron, Sutton and Whetten, 1988; McKinley, 1993). Some studies on organizational decline used time-dependent models, such as, survival analyses and system dynamics (Masuch, 1985). D'Aveni (1989a) and Hambrick and D'Aveni (988) considered time as a contingency that affects organizational responses in declining firms. Along with a review of studies on the consequences of organizational decline that considered time in some form or the other (e.g. Khanna and Poulsen, 1995), I include studies that capture the role of time on change, risk-taking and innovation within poorly performing or financially distressed firms (Bromiley, 1991; Musso and Schiavo, 2008; Hundley, Jacobson and Park, 1996; Zajac and Kraatz, 1993). Table 3.2 lists the studies discussed in this section. I have categorized these studies into those that identified different temporal patterns of decline, those that discussed how time guided change initiatives or domain initiatives undertaken by declining firms, and those that discussed how time affected risk taking or innovation within declining firms.

How are time and decline related? Based on the timing of the consequences of decline, D'Aveni (1989a) identified three distinct patterns of firm decline prior to bankruptcy: sudden decline, gradual decline and lingering. Sudden decliners are the ones

whose combined level of internal financial and managerial resources deteriorated all of a sudden in the last two years prior to bankruptcy. Gradual decliners are the firms whose internal resources deteriorated gradually in the five or six years prior to bankruptcy. Finally, lingerers are the firms that declined rapidly or gradually but delayed bankruptcy for about six years while remaining in a state with insufficient level of managerial and financial resources.

In an event method study, Khanna and Poulsen (1995) examined managerial actions of declining firms and compared them with those of control firms. They found that in the last three years prior to bankruptcy, managers of declining firms engaged in asset sales, plant closings, personnel downsizing, acquisitions, expansions, new debt and equity issues, equity for debt swaps and debt restructuring. As compared to managers of surviving firms, managers of declining firms engaged in these activities more often. Zajac and Kraatz (1993) found evidence of organizational restructuring within declining American liberal arts colleges. They used discrete time event history analysis (Allison, 1995) and found that colleges undergo restructuring in response to changing environmental conditions. This method allows the independent variables to vary over time on the hazard of the event. Here, the event is any of the three modes of restructuring (addition of business program, addition of graduate program and change from a single sex institution to a coeducational institution).

A study that is very different from the aforementioned empirical studies captured the temporal dimension of organizational decline using the principles of systems dynamics (Masuch, 1985). This dynamic model includes relations between several inter-dependent aspects of organizations. These relations are depicted in the form of: (a) reinforcing loops where an increase in the first element leads to a corresponding increase in the second element, and (b) balancing loops where an increase in the first element leads to a

corresponding decrease in the second element. This dynamic model of organizational decline is depicted as a vicious circle where managers while trying to avoid decline take certain actions which aggravates decline. This downward spiral, once triggered, may not be reversible.

In yet a different type of study, Musso and Schiavo (2008) developed a new time-varying and continuous index that measures financial constraints faced by firms. This index captures the different levels of financial constraints of firms in different periods. Over time, firms are likely to switch between being constrained or unconstrained depending on overall credit conditions, investment opportunities and idiosyncratic shocks. In order to develop this index, the authors used the following seven variables: size, profitability, liquidity, cash flow generating ability, solvency, trade credit over total assets and repaying ability. The authors used a time-dependent empirical method (survival analysis) to examine the relation between size growth at different time horizons, initial financial constraints, and a set of standard control variables including time-industry dummies. They measured size growth in terms of output, employment, and capital stock. They captured the dynamic effect of financial constraint by computing growth over three different time spans: one, three and five years. This analysis revealed that financially constrained firms are likely to exit the market. Interestingly, they also found that financially constrained firms increase productivity growth in the short-run. The results suggest that some firms adapt to declines in their financial fortunes, with the possibility of success related to both time and context.

Declining firms do try to enter or exit business domains over time. Hambrick and D'Aveni (1988) captured the effect of temporal dynamics on domain initiatives within declining firms. They examined four factors in the years preceding decline for large firms:

domain initiatives, environmental carrying capacity, slack, and performance. Their model of decline represents a downward spiral. They found that declining firms showed signs of deterioration from as early as ten years prior to failure. Interestingly, when compared to firms that survived, firms that failed engaged in the same amount of average domain activities. They entered the same number of new domains on average and opened up the same number of new locations on average. However, the bankrupt firms had higher variations in the number of new domains. This suggests that the bankrupt firms either entered too many domains or too few domains. Overall, Hambrick and D'Aveni (1988) found that organizational decline follows a downward spiral with four phases. The earliest period of decline (before ten years prior to bankruptcy) showed early symptoms of deteriorating slack and profitability. The second stage of decline that lasts from about ten years prior to bankruptcy to about six years prior to bankruptcy, hastened the deteriorations of slack and profitability. In the third stage of decline (from about six years to about three years prior to bankruptcy), firms engaged in strategic vacillations with too many or too few activities. In the last stage of decline (the three years just before bankruptcy), firms continued to show strategic vacillations, and their environmental carrying capacity and organizational slack level declined abruptly. These results suggest that firms attempt to adapt to performance declines but the adaptive responses fail.

In using a measure of risk-taking, Bromiley (1991) found that poorly performing firms engage in riskier initiatives and these risks lead to further poor performance. In observing investments in innovation (R&D intensity), Hundley, Jacobson and Park (1996) found that US firms fluctuated their innovation focus (i.e. R&D intensity) corresponding to fluctuations in their profitability and liquidity. Again, firms do seem to attempt actions as the

firm's performance deteriorates, but the actions may represent too little, too late. This begs the question of how well firms do if they respond in the earlier stages of the decline phase.

To sum up the review of the available literature on the contingent role of time in organizational decline, D'Aveni (1989a) identified patterns of decline based on the rate and the timing of decline. The time pacing of decline dictates the survival chances and the responses of declining firms. Therefore, the association between calendar time and deteriorating financial performance (i.e. decline) is not the same for all declining firms. For the gradual decliners, with the change in the annual calendar time, there is a gradual change in the financial conditions. However, that does not hold for the sudden decliners and the lingerers. Hambrick and D'Aveni (1988) examined further the effect of time on the domain initiatives undertaken by declining firms. They found that with change in the annual calendar time, the corresponding change in the average number of domain initiatives of bankrupts and survivors did not differ. Also, they found evidence of a downward spiral leading to bankruptcy. From ten years to six years prior to bankruptcy, the corresponding changes in the variations of domain initiatives undertaken by bankrupt firms and survivors did not differ. But, from five years to one year before bankruptcy, the corresponding changes in the variations of domain initiatives by bankrupts were much greater than those by survivors. All in all, we know little about the pattern and impact of variation of responses in early stages of organizational decline (McKinley, 1993).

3.3 Common themes and gaps in the contingency literature on organizational decline

To reiterate the prior contingency findings of scholars on organizational decline, whether or not declining organizations employ threat rigid or adaptive responses will depend

on several contingency factors, such as: amount and type of slack resources, past financial firm performance, and time. Among all these factors studied, majority of the scholars considered slack as a crucial contingency variable that guide the behavior of declining firms. In my study, I focus on the following contingency categories: organizational slack and time.

I seek insight into four questions: (1) What are the contingency conditions under which declining firms are likely to be more adaptive and less rigid (i.e. agree with the behavioral theory and the prospect theory perspectives on decline)?, (2) What are the contingency conditions under which declining firms are likely to be more rigid and less adaptive (i.e. agree with the threat rigidity theory perspective on decline)?, (3) Are the internal processes within declining firms dynamic i.e. is there a change in the pace and nature of change initiatives undertaken by declining firms?, and (4) Does the interaction of organizational slack and annual calendar time affect organizational responses of declining firms?

3.4 The relevance of this review for the central research problem of this study

In this study, I examine changes in search routines within declining firms and compare them with those within matched surviving firms. Each of the unresolved questions that I have mentioned in the above section is relevant for this study.

Consider question 1: What are the contingencies that lead declining firms to engage in adaptive change? The most frequently discussed category of contingencies is slack. Slack buffers a firm's technical core from environmental disturbances (Bourgeois, 1981). Slack also initiates search for alternative solutions (Cyert and March, 1963). Therefore, slack is important for aiding change in search routines of a firm irrespective of whether the firm is

declining or not. Organizational slack is crucial for declining conditions. During declining performance, firms with greater levels of slack can engage in innovation, risky initiatives and adaptive change. Again, slack that is absorbed within existing organizational routines, such as, additional costs, additional personnel, and additional technology, can be removed as a part of efficiency improvement strategy within declining firms. This type of slack is called recoverable slack or absorbed slack (Bourgeois and Singh, 1983).

Now, consider question 2: What are the contingencies that lead declining firms to become threat rigid? The contingency of organizational slack that leads to adaptive change can also lead to threat rigid responses under different conditions. Behavioral theory (Cyert and March, 1963) suggests that potential slack (e.g. a firm's unused borrowing capacity) can guide the responses of declining firms and facilitate successful adaptation. Yet, slack as "inefficient" perspective of the agency theory (Jensen, 1986) suggests a different outcome. In declining firms, greater levels of slack are likely to increase conflict among employees. For example, research and development managers will confront sales managers while deciding on where to allocate slack resources. The conflict, in turn, will decrease chances for effective response.

Consider question 3: Are the changes within declining firms dynamic i.e. do the internal processes within declining firms change with respect to time? In support of an affirmative answer to this question, Hambrick and D'Aveni (1988) found that the decline of firms involve a downward spiral with steeper deteriorations during the last few years prior to bankruptcy. This prompts an interesting question in terms of search routines. Do declining firms initiate (if they initiate at all) changes in their search routines just once? Or do declining firms change their search routines in sync with the changes in their changing slack

levels? To rephrase this, is the change in search routines of declining firms a function of annual calendar time or is it a function of the interaction of annual calendar time and the level of organizational slack? This leads us to the final question.

Does the interaction of organizational slack and annual calendar time affect organizational responses of declining firms? D'Aveni (1989a) identified different types of decline (sudden decliners, gradual decliners and lingerers) based on the rates of decline of combined managerial and financial resources of the declining firms. In his study, the diminishing combined level of managerial and financial resources indicates firm decline. He mapped firm decline (in the y-axis) against annual calendar time (in the x-axis). Sudden decliners, gradual decliners and lingerers portrayed different shapes in the graph. Each of the lines for these three types of firms is not parallel to each other. Therefore, there is no conclusive evidence of exact correspondence between firm's financial conditions and annual calendar time. Again, Hambrick and D'Aveni (1988) found that firm decline follows a downward spiral with sudden deteriorations in the bankrupt firms in the last two years immediately before bankruptcy. They considered changes in slack resources, environmental carrying capacity, domain initiatives and firm performance over the last ten years of bankrupt firms and their matched survivors. Therefore, their downward spiral model suggests that the deteriorations in firm performance and slack resources in the last ten years prior to bankruptcy are not necessarily linear. Since there is no conclusive evidence of an exact correspondence between the levels of organizational slack and annual calendar time, in this study, I examine the contingent effects of the interaction of organizational slack and the annual calendar time.

CHAPTER 4: ORGANIZATIONAL DECLINE: COMPARATIVE PERSPECTIVES

In this chapter, I review the empirical findings of a wide variety of studies on organizational decline. The empirical findings that I consider include comparisons between: (1) bankrupt firms and non-bankrupt firms prior to bankruptcy; (2) well performing firms and poor performing firms; (3) financially constrained firms and financially unconstrained firms; and (4) successful turnaround firms and failed firms in the period before failure. While in this study my focus is only on bankrupt firms and non-bankrupt firms during the pre-bankruptcy period, the empirical findings of all four types of comparative studies support the research. After the review, I discuss what are the common themes, differences and gaps identified in the comparative empirical findings. Finally, I conclude by indicating how this study is relevant for resolving at least some of these gaps.

4.1 Comparing bankrupt firms and surviving firms in the pre-bankruptcy period

Scholars find significant differences between bankrupt and non-bankrupt firms in the following areas: (1) strategic changes; (2) financial conditions; and (3) market reactions to public announcements of management actions. I include a review of the strategic changes because any strategic change is likely to result from changes in search routines. I also include reviews of the differences in firms' financial variables between bankrupt firms and non-bankrupt firms, as firms file for bankruptcy due to deteriorating finances. I include a review of the market reactions to announcements in bankrupt firms and non-bankrupt firms because it shows that the market reacts similarly to major announcements by both groups of firms.

This hints at the fact that the responses of bankrupt firms and non-bankrupt firms may include attempts to adapt to decline. In turn, changes in search routines of bankrupt firms relative to the changes in search routines of non-bankrupt firms may provide important insights about the failed firms.

When compared to surviving firms, failing firms have declining sales (Khanna and Poulsen, 1995; Moulton, Thomas and Pruett, 1996), accelerating cost problems (D'Aveni, 1989a), more liquidation (D'Aveni, 1989a), more employee cutbacks (D'Aveni, 1989a), and reduced throughput activities (D'Aveni, 1989a). However, Hambrick and D'Aveni (1988) found that failing firms were generally no more inertial than surviving firms. Both failing and surviving firms undertook domain initiatives (i.e. changes in the number of wholly owned and partially owned subunits). But, failing firms vacillated more in their domain changes. Failing firms engaged in very low and very high levels of domain initiative. Both groups changed their primary industry in the five year period prior to bankruptcy. Failing firms also did not differ from surviving firms in the absolute sales three years prior to filing (Khanna and Poulsen, 1995), their level of diversification (Sheppard, 1994), the number of joint ventures undertaken (Sheppard, 1994), the extent of plant closings, layoffs, asset sales or downsizing (Khanna and Poulsen, 1995) and growth in location (Hambrick and D'Aveni, 1988). However, D'Aveni (1989a) found that failing retailers and transportation firms reduced the number of locations they served in the two years immediately prior to bankruptcy.

When compared to surviving firms in terms of financial variables, failing firms have rapidly declining profitability (Daily, 1996; Daily and Dalton, 1994b; D'Aveni and MacMillan, 1990; Hambrick and D'Aveni, 1992), higher performance instability (D'Aveni

and MacMillan, 1990), declining net income (Daily and Dalton, 1994b), lower operating performance (Hambrick and D'Aveni, 1988), lower operating income to assets ratio (Khanna and Poulsen, 1995), and declines of operating income to assets ratio (Khanna and Poulsen, 1995). Relative to non-bankrupt firms, bankrupt firms increased their debt faster (Moulton, Thomas and Pruett, 1996), decreased their leverage rapidly (Daily and Dalton, 1994b), reduced firm equity (Daily and Dalton, 1994b) and decreased slack rapidly (Hambrick and D'Aveni, 1988). Failing firms have high levels of long-term debt (D'Aveni, 1989a), more debt swaps (Khanna and Poulsen, 1995), lower unused borrowing capacity (D'Aveni, 1989a), lower turnover ratio (Beaver, 1966), lower current ratio (Beaver, 1966), lower working capital to total assets ratio (Beaver, 1966), higher debt-to-total assets ratio (Beaver, 1966), lower net income to total assets ratio (Beaver, 1966), lower cash flow to total debt (Beaver, 1966) and lower amount of slack (Hambrick and D'Aveni, 1988). Therefore, bankrupt firms have lower levels of available financial resources (Sheppard, 1994) when compared with non-bankrupt firms in the years prior to their bankruptcy. In contrast, failing firms did not differ from surviving firms in the quantity of assets (Moulton, Thomas and Pruett, 1996) and the book value of assets (Khanna and Poulsen, 1995).

The stock market does not differentiate between failing firms and surviving firms (Khanna and Poulsen, 1995) when reacting to announcements regarding restructuring or downsizing, changes in top management, debt financing, debt swaps, and issuance of common or preferred stock. The stock market reacts positively to announcements of plant closings, layoffs, asset sales or downsizings of both failing firms and surviving firms. Interestingly, the stock market reacts unfavorably to changes in top management of both failing and surviving firms (Khanna and Poulsen, 1995). Hence, investors generally do not

consider managerial replacement to be a cure for financially distressed firms. The cumulative abnormal returns of debt financing announcements, such as new credit agreements, new debt issuances and loan extensions are insignificant for both Chapter 11 firms and surviving firms (Khanna and Poulsen, 1995). The market reacts slightly unfavorably to issuance of common or preferred stock by both failing and surviving firms (Khanna and Poulsen, 1995). In contrast, the stock market differentiates its response to announcements of acquisitions or expansions by the two groups. The market responds favorably to acquisitions and expansions of surviving firms, but not for failing firms. Overall, with the exception of acquisitions, these results indicate that investors view managers within both failing and surviving firms as capable and actively pursuing investment decisions in the best interests of stakeholders. These do not support the view that managers of failing firms are incompetent or that they make poor investment decisions (Khanna and Poulsen, 1995).

In summary, bankrupt firms are worse off than surviving firms on some but not all of the dimensions of strategic change. Failing firms had more cost problems and declining sales when compared with surviving firms. However, failing firms and surviving firms did not differ in strategic change variables, such as the level of diversification, the extent of plant closings, location growth and entering new domains. Managers within both bankrupt and non-bankrupt firms made decisions that resulted in similar stock market reactions (e.g. restructuring, debt financing and issuance of stock). While there are great differences in the financial performance of the two groups, the explanation seems to be related to differences in the pattern of action or differences in the results of similar actions, rather than rigidity, per se. I will argue later that the differences in outcomes are due to differences in search routines.

4.2 Comparing poor performing firms and well performing firms:

Not all poorly performing firms file for bankruptcy (Daily, 1996). Some firms continue to exist for a long time with poor performance (these firms are classified as lingerers by D'Aveni, 1989a; they are also classified as Type 3 failed firms by Argenti, 1976) while some other firms successfully turnaround from poor performance (Barker and Duhaime, 1997). Several scholars have examined differences between well performing and poor performing firms in the following categories: (1) product characteristics, (2) business characteristics, (3) strategic change, and (4) internal firm characteristics, such as organizational structure, risk, aspirations, managerial characteristics and board characteristics.

How do poor performing businesses and well performing businesses differ with respect to their product characteristics? Compared with well performing businesses, poor performing ones have older products, higher prices and lower average product quality (Woo, 1983). Poorly performing businesses have higher direct costs than their competitors when compared to strong performers (Woo, 1983).

Relative to well performing businesses, how do poor performing businesses differ in terms of their business characteristics? In a sample of seven hundred and four businesses from the Profit Impact of Market Strategies (PIMS) database, Woo (1983) found that about forty four percent of poor performing businesses gave importance to auxiliary services while only twenty percent of successful ones gave importance to auxiliary services. She also found that compared with well performing businesses, more poor performing businesses offered professional advice. Successful businesses in her sample are more oriented toward components and raw or semi-finished materials while the ones with substandard performance

participate heavily in capital goods. Businesses with low performance are consistently associated with greater commitment to their organizations as indicated by their higher percent of internal purchases.

How do poor performing firms differ from well performing firms in terms of strategic change? Firms that perform below their industry average undertake strategic reorientation when compared with firms that perform above their industry average (Lant, Milliken and Batra, 1992). Poor performing firms undertake more strategic change initiatives (Boeker, 1997) and change their domain more often (Ketchen and Palmer, 1999) than other firms.

In terms of their internal firm characteristics, when compared to well performing firms, poorly performing ones adopt more centralized decision making structure (Singh, 1986), have lower slack (Singh, 1986), are more likely to add high technologies (Ketchen and Palmer, 1999) are more likely to delete high technologies (Ketchen and Palmer, 1999) and take more risks (Bromiley, 1991; Singh, 1986). Among poor performers, the firms with greater expectations (Bromiley, 1991) and greater aspirations (Bromiley, 1991) increase their risk taking further.

Despite the great differences between poor and strong performers, there are also similarities. Businesses with substandard performance and those with good performance do not differ in terms of market stability, buyer fragmentation, and supplier integration. Poorly performing businesses also do not differ from well performing businesses in terms of the percentage of internal sales, percentage of shared manufacturing facilities, percentage of shared marketing distribution channels and shared marketing programs (Woo, 1983). Contrary to expectations, the two groups of firms share some similarities in their strategic

characteristics, such as relative new product emphasis, relative product breadth, percentage of revenue invested in process R&D, percentage of revenue invested in product R&D, relative backward vertical integration, relative forward vertical integration, relative advertising, and relative sales force (Woo, 1983).

In summary, poorly performing businesses and well performing businesses vary in certain dimensions (e.g. focus on auxiliary services, domain change initiatives, product price, product quality and risk taking) and are similar in certain other dimensions (e.g. product focus and breadth, and product and process innovation). The finding that poor performing firms and businesses take more risks indicates that they are likely to change their search routines in order to respond to decline. However, the evidence that poor performing firms and businesses do not differ from their well performing counterparts in terms of product focus and breadth suggests that both declining firms and surviving firms might demonstrate inertia in their search routines.

4.3 Comparing financially constrained firms and financially unconstrained firms

Financially constrained firms are those that face problems in raising external capital (Hadlock and Pierce, 2010). A firm will be classified as financially constrained if it cannot make an investment because of the high cost of acquiring external funds or the lack of availability of external fund (Kaplan and Zingales, 1997). Not all financially constrained firms are financially distressed. For example, a firm holding a high amount of cash on hand may be financially constrained but not financially distressed (Haldlock and Pierce, 2010). This is because a firm with a high amount of cash can use that cash to fund expansions, such as increase its existing search routines, at least in the short run. Therefore, this firm with a high amount of cash is not financially distressed. However, for major expansions, such as

increasing the number of product lines and increasing the number of products developed, the same firm may need to borrow from external sources. If the firm is financially constrained, then it cannot borrow adequate finances from external sources.

How differently do financially constrained firms and unconstrained firms behave? Financially constrained firms hoard cash (Almeida, Campello and Weisbach, 2004). Cash hoarding is costly because holding cash leads to reduction in investments (Almeida et al., 2004). These firms exhibit a positive cash flow sensitivity of cash; i.e., they show a systematic propensity to save cash inflows (Almeida et al., 2004). This cash flow sensitivity of cash increases during recession (Almeida et al., 2004). They do not undertake acquisitions and do not give out dividends (Kaplan and Zingales, 1997). In contrast, financially unconstrained firms do not show a propensity to save cash and do not change their cash saving behavior in response to recession (Almeida et al., 2004). They invest to a greater extent on acquisitions (Kaplan and Zingales, 1997). Relative to financially unconstrained firms, financially constrained firms have lower investments, less sales growth, lower interest coverage, higher debt as a proportion of total capital, lower unused line, lower value of slack as a proportion of capital, and lower change in debt as a proportion of capital (Kaplan and Zingales, 1997). Financially constrained and unconstrained firms are similar in terms of dividends as a proportion of capital and equity issue as a proportion of capital (Kaplan and Zingales, 1997).

In summary, financially constrained and unconstrained firms differ mainly in their cash use and investment behavior. Financially constrained firms have a relatively disadvantaged position. If declining firms are financially unconstrained, they might access

external funds to increase their search routines, and are likely to be in an advantageous position than declining firms that cannot access external funds.

4.4 Comparing non-turnarounds and successful turnaround firms

Turnaround firms are those firms that exhibit "a substantial and sustained positive change" following a period of deteriorating financial performance (Bibeault, 1982:18). In contrast, non-turnarounds are those firms that do not exhibit improvement of their deteriorating financial performance. Prior scholars have examined the differences between non-turnarounds and successful turnaround firms. These firms differ from each other in the following broad categories: (1) strategic change variables, and (2) firms' financial variables.

Non-turnarounds differed from successfully turned around firms (or businesses) in terms of two broad categories: efficiency strategies, and recovery strategies. Efficiency strategies involve retrenchment or cutbacks in such areas as asset reduction, cost reduction, and investment reduction in marketing and research and development.

Compared to successful turnarounds, non-turnarounds use cutback strategies to a greater extent (about seventy three percent of non-turnarounds versus about fifty eight percent of turnarounds) (Arogyaswamy and Yasai-Ardekani, 1997). The firms that fail to turnaround employ cutbacks in product development (Zimmerman, 1989) and R&D expenditures (Hambrick and Schecter, 1983). Relative to successful turnarounds, non-turnarounds are less successful in improving employee productivity (Chowdhury and Lang, 1996; Francis and Desai, 2005; Hambrick and Schecter, 1983) and capital productivity (Francis and Desai, 2005). Non-turnarounds do poorly in improving overall efficiency (Arogyaswamy and Yasai-Ardekani, 1997), inventory efficiency (Zimmerman, 1989) and

factory efficiency (Zimmerman, 1989). Non-turnarounds carry out more divestitures especially of losing businesses (O'Neill, 1986a; Zimmerman, 1989), do not sustain their cost reductions (Zimmerman, 1989), and do not achieve low cost production (Zimmerman, 1989).

Findings about the role of retrenchment in the process of turnaround are mixed. A majority of scholars found that retrenchment (both asset and cost retrenchment) is central to effective turnaround (Bruton, Ahlstrom and Wan, 2003; Chowdhury and Lang, 1996; Francis and Desai, 2005; Hambrick and Schecter, 1983; Robbins and Pearce, 1992). However, a few scholars did not find evidence that retrenchment is central to turnaround (Fisher, Lee and Johns, 2004; Hambrick and Schecter, 1983). In fact, Barker and Mone (1994) and Smith and Graves (2005) even report that non-turnarounds adopted retrenchment strategies (asset and cost retrenchment) too aggressively.

Relative to successfully turned around firms, non-turnarounds carry out more mergers, bring fewer differentiated products to the market, bring out fewer innovations, innovate less and ignore product quality (Zimmerman, 1989). Non-turnarounds also make frequent and abrupt changes in the positioning of their products in the market (Zimmerman, 1989). When compared with turnarounds, non-turnarounds show reduced sales growth during the post-decline phase (Ramanujam, 1984), show fewer instances of increased investment in R&D expenditure (Arogyaswamy and Yasai-Ardekani, 1997), invest sporadically on expansion plans (Zimmerman, 1989), invest on new plant and equipment to a less extent (Hambrick and Schecter, 1983), and increase new products while at the same time decrease marketing expenses (Hambrick and Schecter, 1983).

In terms of financial variables, when compared with turnaround firms, non-turnaround firms have greater financial distress (Francis and Desai, 2005; Smith and Graves, 2005), lower profitability (Smith and Graves, 2005) especially during the recovery period (Zimmerman, 1989), low levels of liquidity (Smith and Graves, 2005) and more urgent decline (i.e. more severe and more sudden decline) (Francis and Desai, 2005). During the pre-decline phase, non-turnarounds have lower levels of performance, lower rates of growth in net income and lower leverage (Ramanujam, 1984). The inventory characteristics of turnarounds and non-turnarounds differ. Non-turnarounds have higher levels of inventory as a proportion of sales (Poston, Harmon and Gramlich, 1994) and faster growth of inventory as a proportion of sales (Ramanujam, 1984) than successfully turned around firms. In addition, non-turnarounds have higher plant and equipment levels (Chowdhury and Lang, 1996) and lower operating profit margins (Pant, 1986).

Relative to successful turnarounds, non-turnaround firms have greater non cost-of-sales expense as a percentage of revenue (Zimmerman, 1989), a greater dependence on external finances during the decline phase (Ramanujam, 1984), faster growth of receivables as a proportion of sales (Ramanujam, 1984), high level of overhead as a proportion of earning assets (O'Neill, 1986b), higher loan income as a proportion of gross loans (O'Neill, 1986b), lower levels of total liabilities as a proportion of total capital (Poston, Harmon and Gramlich, 1994) and lower levels of accounts payable (Chowdhury and Lang, 1996). The debt levels of turnaround firms grow at a faster rate than non-turnaround firms during the pre-decline and decline phases. However, during the turnaround phase the turnaround firms reduce their dependence on debt (Ramanujam, 1984). During the pre-decline, decline and post-decline phases, the capital intensity of the average turnaround firms remain more or less

constant whereas that of the average non-turnarounds increase progressively (Ramanujam, 1984). In the pre-decline phase, turnarounds and non-turnarounds have about the same ratio of retained earnings-to-equity. However, the value of this variable deteriorates faster for non-turnarounds than successful turnarounds during the decline phase (Ramanujam, 1984). Turnaround firms as well as non-turnarounds reduce their losses but the turnaround firms' reduction of losses is typically more pronounced, more internally focused and last much longer (Zimmerman, 1989).

Turnarounds and non-turnarounds share similarities in the percentage of free assets (Smith and Graves, 2005), pre-decline sales growth (Ramanujam, 1984), growth rate of total assets (Ramanujam, 1984), growth rate of invested capital (Ramanujam, 1984), rate of growth of total assets as a proportion of total sales (Ramanujam, 1984), change in accounts receivables (Bruton, Ahlstrom and Wan, 2003), income as a proportion of total capital (Poston, Harmon and Gramlich, 1994), sales as a proportion of net plant (Poston, Harmon and Gramlich, 1994), receivables as a proportion of inventory (Poston, Harmon and Gramlich, 1994), quick ratio (Poston, Harmon and Gramlich, 1994) and cash as a proportion of total assets (Poston, Harmon and Gramlich, 1994).

In this section, I have mentioned previous findings that identified the differences between non-turnaround and turnaround firms. Non-turnarounds are worse than turnaround firms in several aspects, including efficiency improvement, innovation, productivity improvement and cost reduction. Surprisingly, non-turnarounds are similar to turnarounds in several aspects, such as the volatility and concentration of their industries, and available slack (as measured by quick ratio). Scholars do not agree whether retrenchment is central to

turnaround, whether acquisitions facilitate turnaround, and whether turnaround firms undertake financial restructurings to a greater extent than non-turnarounds.

4.5 Common themes and differences in the comparative literature on organizational decline

In this chapter, I have reviewed four sets of comparative studies on organizational decline. These include comparisons between: (1) bankrupt firms and non-bankrupts, (2) poor performing firms (or businesses) and well performing ones, (3) financially constrained firms and financially unconstrained ones, and (4) non-turnarounds and successful turnarounds. The review confirms typical expectations that bankrupt firms are worse off than non-bankrupts, poor performing firms (or businesses) are worse off than well performing ones, financially constrained firms are worse off than financially unconstrained ones and non-turnarounds are worse off than successful turnarounds. Given these stark contrasts, we might expect that declining firms exhibit rigid behaviors consistently.

Somewhat surprisingly, there are many similarities between these sets of firms (Refer: Table 4.1). Given the similarities, organizational decline, poor performance and financial constraints need not lead to threat rigidity. Instead, these adverse conditions can prove to be opportunities for firms to rejuvenate themselves. Declining firms engage in strategic change initiatives as do surviving firms (Hambrick and D'Aveni, 1988). Managers within declining firms do take strategic actions that are valued identically to those taken by surviving firms. Declining firms do try to adapt.

More specifically, both bankrupts and non-bankrupts have similar average number of domain initiatives in the ten years prior to bankruptcy (Hambrick and D'Aveni, 1988). Both sets of firms change their primary industry in the last five years prior to bankruptcy

(Hambrick and D'Aveni, 1988). Declining and surviving firms also engage in similar levels of diversification (Sheppard, 1994), joint ventures (Sheppard, 1994), and plant closings, layoffs and downsizing of assets (Khanna and Poulsen, 1995). Declining firms are not always threat rigid. Hence, these findings support behavioral theory and the prospect theory predictions regarding organizational decline. Managers become risk seeking and undertake suitable change initiatives. This suggests that the search routines within declining firms are likely to be changed in order to improve the deteriorating conditions within the firms.

Rather than managerial rigidity, contextual conditions may explain firm failure. My review of financial characteristics, as they relate to the difference between good and poor performance or survival and failure, point to the key role that slack plays. Relative to surviving firms, declining firms have low levels of potential slack and similar levels of available slack. Potential slack allows a firm to borrow money from external sources to fund expansions in resource-crunched search routines. Potential slack also allows a firm to access external finances to increase search routines. Because declining firms have low levels of potential slack, they are likely to get restricted access to expand their search routines. However, available slack in the form of cash and excess personnel can be used in the short-term to enhance search routines.

4.6 The gaps in this literature and the central research problem in this study

If both declining and surviving firms engage in change initiatives, then why do some declining firms end up in bankruptcy? What are the underlying factors that prior scholars have not captured that may answer this question? My contention is that firm adaptation requires a change in search routines. The form of change in search routines will be affected

by the amount and type of slack resources in the firm's possession, the time phases in the decline period, and the interaction between time and slack.

CHAPTER 5: ORGANIZATIONAL ROUTINES AND ORGANIZATIONAL DECLINE

This dissertation is a study of how organizations change (or fail to change) during conditions of organizational decline. Here, in this chapter, I briefly review the concept of routines. I describe research and development as search routine which might lead to effective responses to decline. The effective response may not occur if the search routine is rigid (as suggested by threat-rigidity theory). As will be noted, even when search occurs (as proposed by behavioral theories of the firm), successful adaptation might not occur, due to the nature of selection pressures.

5.1 Definitions and classification of organizational routines

While organizational routines have been defined in a variety of ways, three definitions stand out: (1) organizational routines as recurrent behavioral patterns (Pentland and Rueter, 1994), (2) organizational routines as productive ways of doing specific activities (March and Simon, 1958), and (3) organizational routines as dispositions stored within organizations that allow specific actions to be carried out when triggered by the same stimuli (Hodgson and Knudsen, 2010). Interestingly, these definitions need not be mutually exclusive. Especially, the first two definitions (behavioral regularities and productive techniques) are complementary (Nelson, 2009).

Nelson and Winter (1982) identified three main types of routines: operating routines, investment routines and search routines. Operating routines represent the day-to-day activities within the firms. Such routines are relatively stable. Examples of operating routines

are hiring routines and purchasing routines. Investment routines involve decision making about the firm's capital stock. Such routines change when the decision making environment changes. Examples of investment routines are price setting routines and routines for raising debt. Search routines foster change in the existing routines. Such routines lead to forms of change. Examples of search routines include bench-marking best practices and exploration (i.e. searching for new knowledge that can help improve the current routine).

Dosi, Teece and Winter (1992) define routines as static or dynamic routines. Static routines are the ones that are relatively stable. However, static routines can improve with repetition if learning occurs. In contrast, dynamic routines are the ones that are created to promote change. They are directed towards learning, new product development and new process development. The search routines that I examine in this study are dynamic routines that should enable change in the organization.

Search routines may be meta-routines, a hierarchy of nested operating routines. Meta-routines create dynamic capabilities that extend, modify or create ordinary capabilities and allow firms to respond to changing conditions (Winter, 2003). The search routines that I examine in this study may be capable of creating new capabilities for declining organizations.

5.2 Stability and/or change in organizational routines

While organizational routines may be stable and rarely change (Gersick and Hackman, 1990; Gilbert, 2005), they may also change if and when required (Becker, Lazaric, Nelson and Winter, 2005; Nelson and Winter, 1982). Organizational routines are stable because routines are like genes (Nelson and Winter, 1982). Routines are like genes because

they are inherited over generations of the same firm. They are also like genes, because when organizations expand either organically or by acquiring other firms, current routines are inherited in the expanded parts of the firm.

Routines represent truces among the organization members. Therefore, attempts at changing routines may create conflicts among the organization members. Because conflicts are often difficult to solve without time and money, they are best avoided by preserving the current routines. Additionally, organizational routines constitute organizational memory. Since the concept of memory enables continuity, reliability and persistence, organizational routines are stable. Managers try to control organizational routines and minimize their disruptions. Hence, an organization continues with its existing repertoire of organizational routines.

Organizational routines create generative structures of specific activities by groups of people (Pentland and Feldman, 2005). Such activities are embedded within a network of the overall organizational structure. Therefore, agency (i.e. the role of each individual actor) and structure are central to the construct of organizational routines. Agency can inhibit change in routines because any change by one routine actor requires the approval of other routine actors. Organizational structure is typically inertial (Hannan and Freeman, 1984). Therefore, routines embedded within structures tend to be stable.

Yet organizational routines may change when the external or the internal organizational environment changes. An example of external environmental change is the birth of a new allied industry, such as the birth of biotechnology firms within the

pharmaceutical industry. An example of internal environmental change is change in the power equation within a firm.

According to evolutionary theory (Nelson and Winter, 1982), organizational routines change mainly through the mechanisms of variation, selection, retention, mutation and adaptation. The first three mechanisms of: variation, selection and retention can be explained together. An organization contains a repertory of organizational routines. Selection mechanisms work on the variety of organizational routines performed in an organization. Selection mechanisms include both external and internal selection mechanisms. The routines that are selected are retained in the organization. In contrast, the routines that are not selected are not retained in the organizational repertory. Hence, these routines are less likely to be used in the future. The fourth mechanism: mutation of routines occurs either through imperfect replication or imperfect imitation. Replication is the process of copying organizational routines from one part of the organization to another part of the organization (Szulanski, 1996). However, exact replication is often very difficult, especially when organization members do not get to see a working version of the original routine (Szulanski and Winter, 2002). Therefore, most replicated routines are altered versions of the original routine. Just like replication, imitation involves copying of an organizational routine. However, imitation is the process of copying an organizational routine of another firm. In the absence of direct cooperation between two firms, most imitation lacks a working template of the original routine (Nelson and Winter, 1982:123). Therefore, imitation of an organizational routine also results in an altered version of the original routine. And, finally the fifth mechanism: adaptation occurs in organizational routines when there is a recognized need for minor adjustments to the original routine in the new context. Adaptation typically involves

local adaptation of the original routine (Winter, Szulanski, Ringov and Jensen, 2012), as contrasted to the creation of a new routine.

Organizational routines change mainly through the mechanisms of learning, ad-hoc problem solving and search (Cyert and March, 1963). The first mechanism learning occurs when organization members receive feedback about the performance of the current routines (Levitt and March, 1988). If the performance outcome of a routine falls below the aspired level of performance, then the routine is likely to be changed. Therefore, learning typically leads to incremental changes in current routines. The second mechanism, ad-hoc problem solving occurs when organization members attempt to cater to the short-term need to change a routine (Winter, 2003). This involves investing minimal amount of time and energy to fix the troubled routine to make it run. The final mechanism, search, involves guided effort by organization members to look for a suitable replacement of the current routine or for suitable replacements for sub-routines of the current routine. Search is typically of the satisficing variety rather than of the optimizing variety. Search also tends to be local. This implies that organization members search for suitable alternative routines in the neighborhood of the existing routines. They, then adopt the alternative routine that is merely sufficient for their needs (Cyert and March, 1963).

What triggers the variation or adaptation of routines? What creates learning and problem solving? Does variation or learning occur in failing firms? Conditions that are internal to the firm and foster change in routines include a collapse of the truce between organizational coalitions, changes in management or power, changes in the top management team, turnover of key personnel and losses incurred from the sale of outputs of routines. Each of these conditions is relevant in the discussion of organizational routines within

declining firms. First, declining firms often have conflicts between different organizational coalitions (Cameron, Whetten and Kim, 1987) that lead to collapse of truces. Second, declining firms often experience the exit of top management team (Boeker, 1997; Hambrick and D'Aveni, 1992). Finally, declining firms have many loss-making routines that impact their overall financial performance.

When truces collapse, the organizational hierarchy tries to impose an order to establish coherence and improve profitability. Profitability drops because conflict leads to increase in coordination costs. In such conditions of high conflict, motivation and performance are hampered (Lazaric and Raybaut, 2005). Resolution of the conflict may require the creation of a new routine (Zbaracki and Bergen, 2010).

Organizational routines also represent the power dynamics of firms. Organizational context and agency interact because some individuals have more power than others (Howard-Grenville, 2005). In such conditions, groups can play a prominent role in the selection process of routines by politically struggling for managerial attention and favorable resource allocation. Conflicts are likely to emerge in such situations (Lazaric and Raybaut, 2005). Typically, powerful groups play the role of a selection mechanism. They tend to differentially select organizational routines based on their own perceptions of what is good for the organization (Loch, Sengupta and Ahmad, 2013).

Changes in the top management team include hiring of new managers and reshuffling of existing managers. New managers question established routines because they are not socialized into the existing ways of thinking and acting within the firm. New managers bring in different sets of routinized activities because of their prior professional training (Strang

and Soule, 1998), association with professional networking organizations and their academic training. The reshuffling of managers within a firm extends the manager's legacy routines into novel areas, leading to some forms of mutation and adaptation.

Memory loss due to turnover of key personnel (Becker, 2005a) with valuable idiosyncratic and tacit knowledge (e.g. effective customer relations and understanding of key customer needs) may result in routine contraction. When a new employee is hired to replace the key personnel, she or he may take some time to acquire relevant knowledge (Nelson and Winter, 1982:115). In many cases, the replacement may never acquire the same level of knowledge as the old employee. In such cases, routine actors may change their respective roles in order to accommodate the replacement and to bring the organizational routine to a suitable level of performance. Such changes represent mutation of the existing routine (Nelson and Winter, 1982:115-116). Such a loss of valuable personnel may even reduce the competitive advantage gained from the skilled use of the existing organizational routine (Aime, Johnson, Ridge and Hill, 2010).

When an organizational routine incurs losses, the organization is not likely to continue performing the routine, at least not in the same scale. Typically, the organization then searches for a suitable replacement routine. But, if the organization perceives the adverse circumstances as temporary, then it shrinks or contracts the routine. A series of such contractions can ultimately lead to the death of the routine. If the adversity continues, then the organization either halts the routine or looks for a suitable replacement routine (Nelson and Winter, 1982:122).

5.3 Search routines: stable or dynamic?

Search routines are higher-level organizational routines that are intended to bring about change in other organizational routines (Nelson and Winter, 1982). These routines are dynamic routines in the sense that they change often (Dosi, Teece and Winter, 1992). Using these search routines, firms search over a knowledge space (Katila, 2002). The search routines result in finding of alternative solutions to the existing routines of the firm.

Firms engage in search routines only when conditions are unsatisfactory, such as firms are not sufficiently profitable (Cyert and March, 1963; Nelson and Winter, 1982). Search is satisficing. This means that a search for alternatives is stopped the moment a reasonable solution is found (Knudsen, 2008). Typically, a search solution is accepted when the general cost and return constraints are satisfied and key people in management support the alternative (Cyert and March, 1963). Decision makers within firms satisfice because of limited human capacity to process information. They start searching for an alternative solution when only a significant problem appears else they continue with their existing routines. They consider choice alternatives in a sequential manner. However, the process of sequential evaluation of alternatives stops short of an optimal solution (Knudsen and Levinthal, 2007). There is a hierarchy of search activities. If one search fails, the firm then proceeds to the next (Cyert and March, 1963). Search is guided by the existing routines of the firm (Cyert and March, 1963:224).

There are three fundamental characteristics of search. First, search is irreversible i.e. whatever is found by search is found. Second, search is contingent i.e. search can find only whatever is available to find. Third, search involves fundamental uncertainty i.e. it is very difficult to deterministically predict the solutions of search a priori.

There are many classifications of search, such as problemistic search, and slack search; local search and distant search; and experiential search and cognitive search. Problemistic search is stimulated by a specific problem and it is directed toward finding a solution to that problem (Cyert and March, 1963:169). Typically problemistic search happens when the firm's actual performance falls below its aspiration (Chen, 2008). Chen and Miller (2007) found that search intensity increases when firm's performance falls below its aspiration level. Chen (2008) found that a firm's problem-driven search activity increases when it feels unlikely to achieve the performance target for another year. A firm's search activity decreases when it expects to improve its performance from an underperforming situation to an outperforming situation.

Problemistic search is motivated by a specific problem. A problem is realized when the firm fails to satisfy one or more of its goals. Such a specific problem is solved either by finding an alternative that satisfies the goals or by revising the goals in order to make a solution acceptable. Search continues as long as the problem is not solved (Cyert and March, 1963).

Problemistic search is guided by simple heuristics, such as "search near the symptoms and search near the existing set of organizational routines" (Greve, 2008). When these heuristics do not lead to a satisfying outcome of search, then decision makers engage in more complex search. They then employ the differing heuristic: "search in the organizationally vulnerable areas" (Cyert and March, 1963). Problemistic search is also biased because search is based on the training, experience and goals of decision makers of the firm (Cyert and March, 1963).

Slack search occurs when organizational slack exists (Levinthal and March, 1981; Greve, 2008). Organizational slack consists of excess resources within an organization (Singh, 1986). Slack relaxes the managers' control of research and development projects and encourages experimentation and exploration (Bourgeois, 1981). Chen and Miller (2007) found that slack is positively related to search.

Local search leads to solutions that are nearest to the current routines (Nelson and Winter, 1982). Through local search, a firm seeks to incrementally improve its current routines. Local search indicates that current research activities are closely related to prior research activities (Fleming and Sorenson, 2004). For example, in drug discovery, researchers identify a potential drug candidate by luck or by screening. They, then, use local search to find commercially viable drug candidates by slightly altering the new drug candidate (Fleming and Sorenson, 2004). Local search is most commonly seen because managerial attention is scarce (Cohen, March and Olsen, 1972; Ocasio, 1997). Hence, firms search in a limited number of domains that are near to the existing routines (Miller and Arikan, 2004). Local search starts from where past searches left off (Stuart and Podolny, 1996). This allows firms to save a lot of up-front investments (Winter, Cattani and Dorsch, 2007). Search is most often local because firms tend to be more successful in areas where they already have experience (Cohen and Levinthal, 1989).

Distant search involves more complex search. Distant search yields to solutions that are far away from the current routines (March, 1991). The returns from distant search are more uncertain than the results from local search (March, 1991). For example, an inventor engages in distant search when he or she tries completely new combinations or components (Fleming, 2001).

Experiential search is mainly based on the prior experience of organizational members (Narduzzo and Warglien, 2008). The rules that guide experiential search are based on the experience of decision makers. These rules are revised based on the feedback received of earlier rules and their search outcomes. This is why experiential search reflects incremental trial-and-error learning. Experiential search is also called backward looking search (Chen, 2008; Gavetti and Levinthal, 2000; Nelson and Winter, 1982). Organizational structure, processes and personnel shape the context for resource allocation decisions. Reallocations for search are made by revising previous allocations (Miller and Arikan, 2004).

Cognitive search is mainly based on the decision makers' understanding about the future (Gavetti and Levinthal, 2000). For example, in the case of Polaroid, though management invested heavily in digital technologies, their belief in the "razor/blade" business model delayed commercialization of a stand-alone digital camera product (Tripsas and Gavetti, 2000). Cognitive search is also called forward-looking search. This is because the alternatives identified through search are evaluated based on the decision makers' cognitive maps about the future (Chen, 2008). To illustrate, in drug discovery, the discovery of a new molecule with the required characteristics is based on the cognitive understanding about the characteristics of the molecule that will aid in treating a specific disease (Dosi, Faillo and Marengo, 2008). Cognitive search allows search to be guided toward a preferred direction. The preferred direction can be a combination of cognitive representations, such as prior information, foresight, causal understanding, and heuristic principles (Winter, Cattani and Dorsch, 2007).

Frequently, organizations adopt a form of institutionalized search within a department or an organizational unit, such as a research and development (R&D) department. This is

institutionalized search (Greve, 2008), which refers to the ongoing routinized search of firms. Search by organizational sub-units such as R&D and marketing may respond to ongoing mandates of the firm. R&D resource allocation can be routinized. For example, R&D expenditures may be decided on a fixed percentage of sales (Chen and Miller, 2007; Greve, 2003).

In this dissertation, I study institutionalized forms of search, that is, research and development, in an attempt to learn whether this routine, often described as a dynamic routine, responds in a stable or dynamic way in a declining firm.

5.4 Gaps that remain unaddressed

Do organizational routines change? If they change, then under what conditions do they change? In this study, I attempt to answer this question in the context of failing firms. I examine changes in search routines in declining firms and compare them with changes in search routines of surviving firms. Prior research suggests that declining firms can exhibit either threat rigidity or adaptive change. In Chapter 2, I have discussed about that body of literature in details. In my empirical examination, I compare and contrast threat rigidity (Staw, Sandelands and Dutton, 1981) and the behavioral theory of the firm (Cyert and March, 1963), which make different predictions about the actions of managers or firms.

I suggest that the search activity can be stable (in keeping with threat rigidity theory) and it can be dynamic (in keeping with the behavioral theory of the firm). The variance in response is dependent on the context of the decline, where context is measured as time, slack, and the interaction of time and slack. With respect to routines, the time and slack provide the

means for the search routine to move through its legacy heuristics before engaging in forms of distant search.

An important related question is whether the learning reflects effective managerial adaptation or random variation and selection. While this second question cannot be answered directly, a finding of a high correlation between adaptive responses and survival or between rigid responses and failure might be evidence of the possibility of effective managerial adaptation.

CHAPTER 6: HYPOTHESES

In this chapter, I develop a set of hypotheses that compare and contrast two key theories on organizational decline: (1) The threat rigidity theory (Staw, Sandelands and Dutton, 1981), and (2) The behavioral theory of a firm (Cyert and March, 1963). Here, I examine the search routines, using R&D expenditures and patent counts as measures of search, of failed firms and surviving matched-pairs. I, further, examine how the passage of time towards bankruptcy (that is, the five year period preceding the point of bankruptcy) affects the search routines of the failed firms. In addition, I examine how organizational slack affects the changes in the search routines of these firms. Finally, I examine how the interaction of organizational slack and time affects the search routine of these firms. The two theories compete to explain some of the micro-foundations of routines (Devinney, 2013). In effect, the theories suggest opposite responses to perceptions of decline. While there are many different explanations for the different predictions, two explanations are relevant to this dissertation. First, the two theories differ in their assumptions about decision maker's response to decline. The threat-rigidity school builds on the assumption of an automated, instinctive response, while the behavioral theory of the firms describes a choice based response. Different individuals may respond in different ways to the same signal. Put differently, decline signals trigger interpretive responses that vary with the decision maker. Second, the size of the threat matters, relative to the resources that a firm has to respond to the threat. The presence of slack will influence the interpretive process.

The rest of this chapter is organized as follows. At the beginning, I develop the argument for hypothesis 1. Hypothesis 1 compares the search routines of failed firms with the search routines of surviving firms in each of the five years immediately preceding bankruptcy filing. This hypothesis is based on the arguments and research drawn from the threat rigidity school of scholars. At the end of this discussion, I state Hypothesis 1.

Next, I develop the argument for Hypothesis 2. Hypothesis 2 also examines the differences in search routines of failed firms and surviving firms in each of the five years prior to bankruptcy filing. However, this hypothesis offers a contrasting perspective to Hypothesis 1. Hypothesis 2 is based on insights from scholars following the behavioral theory of a firm school.

Next, I formally develop the argument for Hypothesis 3 and Hypothesis 4, which examine how search routines of declining firms change over the five years prior to bankruptcy filing. I base these hypotheses on the discussions of the threat rigidity school of scholars (Hypothesis 3) and the behavioral theory of the firm (Hypothesis 4). Where the first two hypotheses contrast the patterns of routine change for failed and surviving firms, these two subsequent hypotheses test the relationship between the failing firms' performance in the years prior to bankruptcy and change in the subsequent year of the search routines.

Then, Hypothesis 5 examines the effect of organizational slack on the search routines of all firms (both declining and surviving firms). Basing my discussion on prior scholars on organizational slack, I examine the effect of total slack, available slack, absorbed slack and potential slack on search routines within the two groups of firms: declining firms and surviving firms. Finally, I offer Hypothesis 5.

Last but not the least, I develop the logical argument for Hypothesis 6. Hypothesis 6 examines the effect of the interaction of organizational slack and annual calendar time on the search routines of all firms (declining as well as surviving). Again, I base my discussion on the prior evidences of scholars of organizational slack. At the end of this discussion, I state Hypothesis 6.

6.1 Contrasting threat rigidity and behavioral theory perspectives

Firms that file for bankruptcy are likely to differ from firms that survive. There are at least two key theories that discuss firm or decision maker responses to decline: the threat rigidity theory (Staw, Sandelands and Dutton, 1981) and the behavioral theory of a firm (Cyert and March, 1963). Threat rigidity theory (Staw et al., 1981) suggests that managers within declining firms either continue with their well-learned responses or engage in forms of withdrawal. In contrast, the behavioral theory of a firm (Cyert and March, 1963) suggests that managers within declining firms undertake change initiatives in order to bridge the gaps between their aspirations and their actual performances. Put differently, threat-rigidity theory implies that aspirations are revised downward to match performance, while behavioral theory suggests that managers act to change performance to refit past aspiration levels. In chapters 2, 3 and 4, I review extensively the available studies on organizational decline. In all the studies that I have reviewed from the 1980s to the 2010s there is not an identifiable pattern of evidence supporting either the threat-rigidity perspective or the behavioral theory of the firm. The industry context, firm type (public organizations, for-profit organizations and universities) and time period do not indicate whether firms will be threat rigid or whether firms will engage in search for remedy. Given the equivocal findings, it may be useful to contrast the two perspectives of threat rigidity (Staw et al., 1981) and behavioral theory of the

firm (Cyert and March, 1963) in the US Chemical and Allied Products Industry (SIC: 2800), and attempt to identify contextual variables that might explain the differences in results. The contextual variables I use include slack and time.

The two contrasting theories of threat rigidity (Staw, Sandelands and Dutton, 1981) and behavioral theory of a firm (Cyert and March, 1963) mainly uses different levels of analyses. The threat rigidity theory (Staw et al., 1981) is based on individual psychological reasoning. In contrast, the behavioral theory of a firm (Cyert and March, 1963) mainly includes business-level or firm-level analysis and is based on early administrative science (Barnard, 1938) and economics (Alchian, 1950; Schumpeter, 1934; Schumpeter, 1942). Here, however, I focus on developing hypotheses at the level of organizational routines. I examine the changes (or no change) in search routines of declining firms relative to those of surviving firms by contrasting the propositions of the two key theories. I use routines because a focus on individual decision making may be too reductionist (Winter, 2013), while a focus on the firm level may aggregate decisions across heterogeneous routines. The specific routines studied are research and patenting. Research is a measure of a general set of routines, while patenting is a measure of a related but narrower set of routines.

6.2 Threat rigidity in failed firms and surviving firms

Declining firms face the threat of failure and therefore, rely on its habituated ways of action and on existing organizational routines (Staw, Sandelands and Dutton, 1981). Under the conditions of impending bankruptcy, managers of declining firms reduce the number of alternatives considered. Such reduction in alternatives leads to restriction in information processing, and conservation of resources.

Prior scholars found evidence of the following three types of threat rigidity within declining organizations: (1) Restriction in information processing: by reducing newer paths of search and by sticking to existing ways of doing things, (2) Constriction of control: by increasing centralization within the organization, which in turn introduces hurdles for making changes if, when and where needed, and (3) Conservation of resources: cost cutting and efforts to not increase spending in new developments (Sutton and D'Aunno, 1989). Each of these seems to suggest that search routines of declining firms will be less than those of surviving firms. Confirming their theory, D'Aunno and Sutton (1992) found evidence of threat rigidity in seventy two randomly selected drug abuse treatment organizations when these organizations faced financial adversity. They found that these declining organizations used existing procedures more rigidly and conserved their resources. Such rigid use of procedures led to restriction of information processing.

Many organizational decline studies seem to suggest that declining firms inhibit innovation and instead concentrate on efficiency improvement (Cameron, 1983; Hambrick and Schecter, 1983). Declining firms show signs of strategic paralysis (D'Aveni, 1989a) and maladaptation (Greenhalgh, 1983). They take few domain initiatives. For example: they engage in few mergers and acquisitions (D'Aveni, 1989a). They also downsize their operations by liquidations and divestitures (D'Aveni, 1989a). Cameron, Whetten and Kim (1987) found that declining organizations reduce their innovation and they resist change by rejecting new alternatives. They also found that declining organizations cater to short-term needs and avoid long-term planning. Perceived threats of failure lead managers of firms to be more conservative and to take more internally directed actions (Chattopadhyay, Glick and Huber, 2001). Managers of declining firms then act in domains in which their organizations

have greatest control. Managers within declining firms try to stick to their well-learned responses and avoid change in their organizational routines. We can expect, then, that declining firms have fewer search routines when compared to surviving firms.

Many early studies of organizational decline discuss about the necessity of retrenchment or cut-back within declining organizations. Effective management of decline necessarily involves management of the process of retrenchment (Behn, 1988; Hardy, 1988). Cutback management involves reduction in the current scale of operations, such as: downsizing of units and terminating programs (Hardy, 1990; Levine, 1978). Such cutback strategies allow many declining firms to improve their operational efficiencies (Levine, 1979; Levine, 1985; McKinley, Cheng and Schick, 1986). Efficiency improvement strategies work because declining firms have declining sales compared to surviving firms (D'Aveni, 1989b; Moulton, Thomas and Pruett, 1996). Declining firms also have accelerating cost problems compared to surviving firms (D'Aveni, 1989b; Zimmerman, 1989).

Managers of declining firms tend to engage in asset retrenchment, such as: liquidations of a few plants, and divestiture of some production divisions (Bruton, Ahlstrom and Wan, 2003; Chowdhury and Lang, 1996; Robbins and Pearce, 1992). Some declining firms engage in liquidations and divestitures (D'Aveni, 1989a; O'Neill, 1986a; Zimmerman, 1989). Declining firms even shrink their current domains of expertise (Bozeman and Slusher, 1979). In order to improve operational efficiency, some managers of declining firms rely more on routinized procedures (Cameron, 1983; Sutton and D'Aunno, 1989). These efficiency improvement measures are often directed by short-term goals (Cameron, Whetten and Kim, 1987).

With specific reference to research routines, declining firms have fewer people with R&D background in their top management team (D'Aveni, 1989a). Further, declining firms reduce their R&D spending (Hambrick and Schecter, 1983).

In sum, managers of declining firms stick to learned responses or reduce their organizational routines. Therefore, I offer the following hypothesis.

Hypothesis 1: The investment in search routines of declining firms will be less than the investment in search routines of surviving firms in each of the five years immediately preceding bankruptcy of failed firms, therefore:

1a: The research and development (R&D) expenditure of declining firms will be less than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of the failed firms.

1b: The patent count of declining firms will be less than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of the failed firms.

6.3 Adaptive change initiatives in failed firms and surviving firms

In this study, failed firms are bankrupt firms. I observe firm performance for five years prior to bankruptcy. During this period, if the behavioral theory of the firm holds, the soon-to-be bankrupt firms perform below their aspired performance level. These firms become aware of the survival point (also called the ruin point) beyond which they cannot sustain (March, 1988). Since these firms perform below their aspiration levels, managers within these firms proactively engage in adaptive change in order to improve their deteriorating firm finances.

In this perspective, managers and operational level employees monitor and evaluate the current performances of their routines (Adler, Goldoftas and Levine, 1999; de Leeuw and van den Berg, 2011; Feldman, 2000). When a routine of a firm does not meet its aspired performance, the organization either incrementally improves the current routine through experiential learning (Denrell and March, 2001; Levitt and March, 1988) or the organization revises the current routine by trying out a new routine from the set of routines that exists in its environment. This implies that search activities are increased within declining firms. The organization continues the trial-and-error until it finds a routine that gives a solution that meets the aspiration level (Rerup and Feldman, 2011). For example: managers of declining firms may stop an existing loss-making routine, but they may also choose to install another routine that is profitable in the short-run. For example: a contraction of the routine may involve reduction in the research and development (R&D) spending on one project and another R&D project is added into the existing set of R&D projects conducted by the firm.

Managers of declining firms may undertake more strategic change initiatives (Lant, Milliken and Batra, 1992), such as: diversification of their product market domains (Boeker, 1997; Hambrick and D'Aveni, 1988; Hoskisson and Hitt, 1990) and increase in the variety of products (Manns and March, 1978; Zajac and Kraatz, 1993). Diversification entails adding products and product lines (Bailey, Kobayashi and MacNeill, 2008) beyond their existing capabilities. Such addition of products and product lines indicate that declining firms change their organizational routines through enhanced search activities. Some of these declining firms even change their primary industry (Hambrick and D'Aveni, 1988). Some of these declining firms also increase their production volume (Witteloostuijn, 1998). A few declining firms also add technologies (Ketchen and Palmer, 1999). Again, managers of some declining

firms engage in acquisitions and expansions (Khanna and Poulsen, 1995). Similar to Khanna and Poulsen's (1995) findings, Moulton, Thomas and Pruett (1996) found that some declining firms move to growing industries. Further, declining firms engage in enhanced exploitative search (Walrave, van Oorschot and Romme, 2011). Managers of declining firms increase their search routines in order to be better adjusted to their decline conditions. Therefore, I propose that relative to their matched surviving counterparts, failed firms will increase their search routines in each of the five years prior to their bankruptcy filing.

With respect to specific search routines, firms under decline do engage in a greater extent of innovation than their matched surviving counterparts (Hundley, Jacobson and Park, 1996; Morrow, Sirmon, Hitt and Holcomb, 2007), though the patterns may differ across industries (Nassimbeni, 2003; Tang, 2006). Some declining firms expand beyond their industry and enter new domains (Boeker, 1997), and entering the new domain enhances innovation.

In sum, this perspective suggests that the search routines within declining firms will be more than the search routines within surviving firms in each of the five years immediately preceding bankruptcy filing by the declining firms. Therefore I offer the following hypothesis.

Hypothesis 2: The investment in search routines of failed firms will be more than the investment in search routines of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.

2a: The research and development (R&D) expenditure of failed firms will be more than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.

2b: The patent count of failed firms will be more than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.

Now that I have compared the search routines of the failed firms with the search routines of matched surviving firms, it is essential to compare how the search routines of failed firms change over the time of the decline. This comparison allows examination of the predominant notion that decline is associated with a period of deteriorating conditions (Daily, 1996; Moulton, Thomas and Pruett, 1996). This comparison reflects the role of passage of time towards bankruptcy (Chen and Miller, 2007). In Hypotheses 1 and 2, I examine the differences in search routines of failed firms and those of matched surviving firms. In Hypotheses 3 and 4, I examine the differences in search routines of the failed firms from each year to the next during the five years immediately preceding their bankruptcy. These (Hypotheses 3 and 4) attempt to answer the question: Do declining firms become threat rigid or do they become adaptive as they move towards bankruptcy?

6.4 Effect of time on changes in search routines of declining firms and surviving firms

A firm's response to decline is likely to vary based on the passage of time as these firms move closer to bankruptcy filing. Prior scholars have found that organizational routines follow a pace or rhythm that is based on the passage of time towards a deadline (Gersick, 1989; Kelly and McGrath, 1985) or the mid-point of the routine (Gersick, 1989) or the end of a routine (Gersick and Hackman, 1990). Applying these evidences in the context of declining

manufacturing firms that finally file for bankruptcy, changes in search routines of declining firms may follow a rhythm as the firms move toward bankruptcy, and the threat becomes more salient. The actions taken by managers of declining firms is based on the time at which they became aware of declining conditions within their firms (Furrer, Pandian and Thomas, 2007; Pajunen, 2006). This seems to suggest that how managers vary in their interpretations across time is likely to trigger managerial action directed towards promoting or inhibiting search routines, resulting in different rhythms.

Similar to Gersick and colleagues' findings about the pacing of routines, D'Aveni (1989a) found that declining firms have different paces of depletion of their combined levels of managerial and financial resources. He identified three categories of declining firms: the sudden decliners, the gradual decliners and the lingerers. The sudden decliners depleted their managerial and financial resources abruptly in the two years immediately before bankruptcy. The gradual decliners gradually depleted their managerial and financial resources in the five years before bankruptcy. Finally, the lingerers delayed their bankruptcy for about six years while they remained with insufficient levels of managerial and financial resources. Therefore, D'Aveni's (1989a) findings suggest that the association between annual calendar time and the combined level of managerial and financial resources is not the same for all declining firms. The level of slack resources available to the firm may influence managerial reactions and the directions of changes in routines. And as Upton (1994) showed, routines adapt at different paces.

I propose that changes in search routines of declining firms will also have a rhythm as each year passes and the declining firms move toward bankruptcy. However, I offer a

comparison of two contrasting perspectives (the threat rigidity theory and the behavioral theory of a firm) on the effect of time on the search routines of declining firms.

6.4.1 A threat rigidity perspective on the effect of time

According to the threat rigidity theory (Staw et al., 1981) declining firms perceive bankruptcy as a threat. Therefore, the closer in time to bankruptcy that the declining firms are, the greater is the threat of bankruptcy. Therefore, managers of declining firms are likely to respond differently with the passage of time towards bankruptcy.

A wide variety of prior scholars have found evidence of increased rigidity in declining firms (Mone, McKinley and Barker, 1998). Such firms usually resist any kind of change (Denrell and March, 2001). Managers of declining firms adopt weathering-the-storm strategies by sticking to prior responses and routines that worked well (Nystrom and Starbuck, 1984). Declining public organizations restricted domain definition (Bozeman and Slusher, 1979). Further, declining firms reduced their R&D search intensity (Johnson, 1996) when they came close to bankruptcy (Chen and Miller, 2007).

Deterioration increases over time in declining firms. Hambrick and D'Aveni (1992) found that the declining firms deteriorated at a non-linear, accelerating rate. They also found that declining firms have fewer top managers with core function expertise than surviving firms. They mainly measure deterioration in terms of top management characteristics of these firms. They found that such top management team deficiencies aggravate corporate deterioration. D'Aveni (1989b) found that over time declining firms worsen in terms of prestige, liquidity and leverage.

In keeping with the threat-rigidity perspective, I propose that the declining firms will decrease their search routines over the last five years prior to their bankruptcy filing.

Hypothesis 3: The investment in search routines of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing.

3a: The R&D expenditure of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing.

3b: The patent count of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing.

6.4.2 A behavioral theory perspective on the effect of time

By contrast, the behavioral theory school of scholars (Cyert and March, 1963; Lant and Mezias, 1992) discuss that poor performance creates a gap between an organization's actual performance and its aspirations. In order to cater to this gap, managers within such declining firms will initiate search routines to find solutions to organizational problems (Mone, McKinley and Barker, 1998).

Based on the behavioral theory of the firm (Cyert and March, 1963), Nelson (1981) suggested that declining firms produce few adjustments and respond little under small amounts of adversity, such as: under declining profits. However, declining firms engage in constructive actions and learn productively under moderate adversity, such as: under conditions of real losses without the threat of bankruptcy. And, finally, declining firms decay by responding in inappropriate ways under extreme adversity, such as: under conditions of the threat of bankruptcy. Over the last five years immediately preceding bankruptcy, firms are likely to undergo changes in the levels of adversity. Hence, over the last five years prior

to bankruptcy filing, declining firms are likely to change their search behavior in an attempt to improve their deteriorating conditions. Nelson (1981) found that some firms reorganized their organizational routine. Firms searched for solutions in areas close to what they perceive to be the essence of the problem. For example: a sample company that manufactures electrical and mechanical parts adjusted its markup pricing rules. These evidences suggest that declining firms are likely to undertake change by increasing their search routines in the last five years prior to their bankruptcy filing.

Many prior scholars found evidence of change initiatives within declining firms in the few years before bankruptcy filing (Boeker, 1997; Miller and Friesen, 1983). Declining schools undertake organizational change. Such organizational change involves an incremental or successive change in a wide range of activities (Koberg, 1987). Just like declining schools, declining liberal arts colleges lead to strategic restructuring (Zajac and Kraatz, 1993). Even declining departments within universities increase variety in course offerings, provide more attractive packaging, make courses more accessible and increase course benefits to a greater extent than the same departments under conditions of abundance (Manns and March, 1978). In addition to schools and universities, there are firms that show evidences of attempts at change under decline conditions. The airline industry (Miller and Chen, 1994) and the furniture industry (Lant, Milliken and Batra, 1992) showed evidence of strategic adjustments within declining firms.

Over and above the prior evidences of adaptive change within declining firms, there are evidences of increased risk-taking within declining firms (Singh, 1986). Poorly performing savings and loan firms are more willing to take risks by expanding into risky markets than such firms that performed well (Haveman, 1993). Declining firms engage in

riskier initiatives when they decrease slack and decrease organizational size (Wiseman and Bromiley, 1996). Also, large firms increased their risk-taking when their financial performance deteriorated (Audia and Greve, 2006; Greve, 2011). This supports the view that when faced with organizational decline, firms increase their risk-taking.

With respect to research and development, scholars have found evidence in support of the fact that organizational decline stimulates innovation (Mone, McKinley and Barker, 1998). Organizational decline is found to stimulate innovation in the big six tobacco companies (Cameron, 1983). Bolton (1993) found that poor performing US high technology firms joined R&D consortia early on. After such early joining, a distinct institutionalization effect occurred as R&D consortia became a commonly accepted method of conducting certain types of R&D projects. In a sample of Japanese firms, Hundley, Jacobson and Park (1996) found that profitability declines lead to increased R&D intensity. These evidences imply that declining firms will have increased search routines.

All in all, the above prior evidences seem to suggest that declining firms will increase their search routines in the last five years prior to their bankruptcy filing. Therefore, I propose the following hypothesis and break it up into two testable empirical hypotheses.

Hypothesis 4: The investment in search routines of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.

4a: The R&D expenditure of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.

4b: The patent count of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.

Now, that I have examined the question: do declining firms in the US Chemical and allied products industry exhibit threat rigidity or do they exhibit adaptive change in the last five years prior to bankruptcy? I stretch this question further and ask: under what conditions declining firms exhibit rigidity (if they exhibit rigidity)? And, under what conditions declining firms exhibit adaptive change (if they exhibit adaptive change)? These are the few key questions that I have identified in the end of chapter 2. In Hypotheses 5 and 6, I examine the effects of two conditions: (1) organizational slack, and (2) the interaction of organizational slack and calendar time on the search routines of both declining firms and surviving firms.

6.5 Organizational slack in declining firms and surviving firms

Organizational slack represents the excess resources that a firm maintains to buffer its technical core from external pressures (Cyert and March, 1963). It also aids a firm to search for suitable solutions when its existing routines do not meet their expected performance level. There are studies that suggest that declining firms have less slack relative to surviving firms (Beaver, 1966; Sheppard, 1994; Singh, 1986). However, there is also evidence that counter the above-mentioned findings. Some research indicates that the amount of organizational slack in declining firms and stable firms are more or less the same (Cameron, Whetten and Kim, 1987). However, the amount of organizational slack in declining firms is lower than that in growing firms (Cameron, Whetten and Kim, 1987). Some declining firms increase organizational slack by freeing up assets and human resources (Meyer, 1988). Such firms therefore do not have low levels of organizational slack. Those declining firms that have sufficient financial slack, such as: excess cash and excess borrowing capacity can delay bankruptcy for some years (D'Aveni, 1989b; D'Aveni, 1990). This seems to suggest that the

extent of organizational slack in declining firms when compared with that in surviving firms need not always differ.

As noted earlier, there are three types of organizational slack: available slack, absorbed slack (also called recoverable slack) and potential slack. Available slack includes the resources that are in excess of the current operations of the firm. Such uncommitted resources can be employed immediately for some specific purposes (Singh, 1986). An example of available slack is cash. Absorbed slack includes excess resources that are absorbed in the current operations of the firm. These resources can be made available by freeing them up if there is a need (Bourgeois and Singh, 1983). An example of absorbed slack is excess inventory. Finally, potential slack represents the ability of firms to borrow funds from external sources (Geiger and Cashen, 2002). An example of potential slack is unused borrowing capacity.

Similar to the mixed evidences of the relative amounts of total organizational slack in surviving firms and declining firms, there are mixed evidences of the amount of each type of organizational slack in declining firms relative to surviving firms. Typically, declining firms have low levels of available slack compared with surviving firms (Beaver, 1966; Hambrick and D'Aveni, 1988; Singh, 1986). However, some declining firms do not differ in their amount of available slack when compared with surviving firms (Poston, Harmon and Gramlich, 1994).

Absorbed slack has special relevance in the context of manufacturing industries. This is because absorbed slack may include excess inventory. There are certain principles of manufacturing, such as: lean production and just-in-time manufacturing that recommends

elimination or minimization of inventory i.e. absorbed slack (Shah and Ward, 2003). Such principles are employed in both declining and surviving firms. Therefore, there are declining manufacturing firms that have about the same level of absorbed slack as surviving manufacturing firms (Eroglu and Hofer, 2011). However, some other manufacturing practices recommend maintaining at least moderate levels of inventory in order to help overcome disruptions in supply chain and to better respond to environmental disturbances (Kleindorfer and Saad, 2005; Hendricks, Singhal and Zhang, 2009). Such practices are also employed in both declining firms and surviving firms. Therefore, these results indicate that absorbed slack when measured in terms of excess inventory do not differ in surviving firms and declining firms. In contrast to these evidences, some other evidences suggest that declining firms have low levels of absorbed slack when compared with surviving firms (Singh, 1986; Wiseman and Bromiley, 1996).

In contrast to the mixed evidences of the amount of available and absorbed slack resources within declining firms when compared with the corresponding amounts within surviving firms, prior evidences suggest that the amount of potential slack in declining firms is low compared with that in surviving firms (Daily and Dalton, 1994b; D'Aveni, 1989a; D'Aveni, 1989b; Hambrick and D'Aveni, 1988; Moulton, Thomas and Pruett, 1996).

Overall, majority of evidence suggests that declining firms have low levels of overall organizational slack when compared with surviving firms. All prior evidences indicate that declining firms have low levels of potential slack when compared with surviving firms. However, there are mixed evidences on the amount of available slack and absorbed slack in declining firms when compared with surviving firms.

6.5.1 Effects of organizational slack on the change initiatives in declining firms and surviving firms

As per the behavioral theory of a firm (Cyert and March, 1963), organizational slack enhances adaptive change within both declining firms and surviving firms. This is because high levels of organizational slack allows a firm to employ that slack in order to explore, to search for suitable alternative solutions and to expand their current operations. When firms perform below their aspiration levels, they engage in problemistic-search (Chen, 2008). Problemistic search is "stimulated by a problem (usually a rather specific one) and is directed toward finding a solution to that problem" (Cyert and March, 1963:169). And, when firms have adequate levels of slack resources, they engage in slack-search (Levinthal and March, 1981). Slack search is stimulated because the excess resources in the form of organizational slack can be devoted to search (Cyert and March, 1963). Since declining firms have large gaps between their aspiration levels and the actual performance levels, they are likely to engage in problemistic search routines. In addition, if some declining firms have slack resources then they can also engage in slack-stimulated search. However, as majority of prior scholars (Daily and Dalton, 1994b; Moulton, Thomas and Pruett, 1996) have found evidence of low levels of slack within declining firms, problemistic-search is more likely to be evident in declining organizations.

There is a positive and linear relationship between slack and change initiatives (Barker and Duhaime, 1997; D'Aveni, 1989a). Each of the types of slack: available, absorbed and potential also affect change initiatives positively and linearly. Available slack, such as: excess cash allows firms to use that slack in the short-term while attempting to improve firm performances. High levels of available slack within firms increase change initiatives (Iyer and Miller, 2008; Majumdar and Venkataraman, 1993; Voss, Sirdeshmukh and Voss, 2008).

Similar to available slack, high levels of absorbed slack enhances adaptive change within firms (Miller, Lant, Milliken and Korn, 1996). Again, high levels of potential slack increases change initiatives within firms (Bergh and Lawless, 1998; Iyer and Miller, 2008).

Slack positively affects change initiatives in declining as well as in surviving manufacturing firms. Change initiatives affected by slack include domain offense, domain defense, domain creation and domain substitution (Cameron and Zammuto, 1983). Domain offense involves expanding the current domain of expertise. Domain defense reduces the size of the existing domain. Domain creation involves identifying new domains. Domain substitution involves replacing the current domain with another domain.

6.5.2 Effects of organizational slack on innovation in declining firms and surviving firms

Organizational slack, in general, has mixed effects on innovation in firms. Some researchers report a positive, linear relationship (Cameron, 1983; Mone, McKinley and Barker, 1998); others find a negative, linear effect (Latham and Braun, 2009), and finally, some studies show an inverted U-shaped relationship between organizational slack and innovation (Geiger and Cashen, 2002; Nohria and Gulati, 1996).

The presence of organizational slack is especially helpful for declining firms because such slack can be employed in the short-term and the long-term while attempting to improve firm performances. Available slack, such as: excess cash can be used in the short-term to expand their current domains of expertise by increasing R&D spending. Absorbed slack, such as: excess resources employed in performing a routine, can be freed up to be suitably used elsewhere in the firm. Potential slack, such as: unused borrowing capacity can be used to access external funds to fund fees involved in patenting. All in all, the more the amount of

overall slack and each type of slack, the better are a declining firm's chances of improving its deteriorating firm performance. Therefore, I propose that overall slack and each type of slack is beneficial to declining firms as well as surviving firms. However, slack is extra precious to declining firms when compared to surviving firms because it allows declining firms to last out their deteriorating firm conditions at least temporarily. At the same time, declining firms are not likely to have very high levels of organizational slack. Therefore, in an inverted U-shaped relationship between slack and innovation (Geiger and Cashen, 2002), the portion of the curve that indicates the harmful effects of too-much of slack is not likely to be evident in the context of declining firms. Therefore, I propose that organizational slack will affect the search routines of declining firms non-linearly (i.e. logarithmically). I formally state the following hypothesis.

Hypothesis 5: The search routines of all firms will have a logarithmic relationship with organizational slack.

5a: The R&D expenditure of all firms will have a logarithmic relationship with organizational slack (total slack, available slack, recoverable slack and potential slack).

5b: The patent count of all firms will have a logarithmic relationship with organizational slack (total slack, available slack, recoverable slack and potential slack).

6.6 The effect of the interaction of time and organizational slack

Organizational slack allows firms to adapt to changing environments (March, 1981). Organizational decline implies some form of change in the environment. Compared to surviving firms, declining firms reduce their slack resources at an accelerating rate as they move towards bankruptcy (Hambrick and D'Aveni, 1988). This suggests that organizational

slack amounts may change in declining firms over the last five years prior to bankruptcy. Declining firms that can engage in efficiency improvements by cutting down slack can reverse their decline or at least delay bankruptcy (D'Aveni, 1989a). Also, declining firms that disband assets can delay their bankruptcy (D'Aveni, 1989a). This implies that the presence of organizational slack may allow some firms to delay bankruptcy. The freedom of action afforded by slack, though, decreases as a firm gets close to bankruptcy.

D'Aveni (1989a) found that declining firms follow different patterns of decline. Declining firms following these different patterns of decline face the consequences of decline at different times. The presence of organizational slack may be one factor that differentiates the declining firms following each of these decline patterns.

Here, I propose that the combined effect of the amount of organizational slack and the annual calendar time will affect the search routines of all firms. This is especially important for declining firms. For example: a declining firm that reduces potential slack fast over the last five years before bankruptcy will have different extent of search routines than a declining firm that reduces potential slack slowly over the last five years before bankruptcy. Therefore, here, I propose that the search routines of all firms (declining as well as surviving firms) will be a function of the interaction of the time to bankruptcy and the organizational slack amount. Here, I state the hypotheses formally, based on threat-rigidity theory (6a) and the behavioral theory of the firm (6b).

Hypothesis 6: The search routines of all firms will be a function of the interaction of the amount of organizational slack of the firms and time. Even after controlling for these

interaction effects, the search routines of declining firms will differ from those of surviving firms.

6a: The R&D expenditure and patent counts of firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the R&D expenditure and patent counts of declining firms will be lower than those of surviving firms.

6b: The R&D expenditure and patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the R&D expenditure and patent count of declining firms will be higher than those of surviving firms.

To sum up the hypothesized relationships, I offer two contrasting theoretical perspectives on organizational decline: (1) the threat rigidity theory, and (2) the behavioral theory of a firm. According to the threat rigidity perspective, I propose that compared to their matched surviving firms, declining firms will engage in fewer search routines in each of the five years prior to bankruptcy filing. Further, I propose that the search routines of declining firms will decrease over the last five years prior to their bankruptcy filing. In contrast, according to the behavioral theory of a firm perspective, I propose that relative to their matched surviving firms, declining firms will engage in more search routines in each of the five years immediately preceding their bankruptcy filing. In addition, I propose that search routines of declining firms will increase over the last five years immediately preceding their bankruptcy filing. Finally, I examine the moderating effect of organizational slack on the search routines of all firms (declining as well as surviving). I propose that the search routines

of all firms will have a non-linear relationship with organizational slack. Again, I propose that the search routines of all firms will be influenced by the interaction of organizational slack and annual calendar time. Even after controlling for these effects, the search routines of declining firms will differ from the search routines of surviving firms.

Refer: Figure 6.1 for a look at the total contingency model of this study and the hypothesized relationships.

CHAPTER 7: METHODS

In this chapter, I discuss about the sample dataset, the methods that I apply in analyzing the hypotheses and the measures that I use in order to empirically test the hypotheses.

7.1 Preparing the sample

I used two distinct stages to prepare the final sample of firms that includes declining firms as well as surviving firms. In stage 1, I collected the set of bankrupt firms by using the following steps. First, I found out all bankruptcy filings (this includes both Chapter 11 and Chapter 7 filings) between January 1, 1980 and January 1, 2012 (the time of data collection). I chose this time period based on the specific laws and regulations related to bankruptcy in the US. I also chose this time period in order to get a sufficiently large sample size of bankrupt firms. The Bankruptcy Reform Act of 1978 went into effect on October 1, 1979. A majority of the provisions for Chapter 11 and Chapter 7 filings by organizations in the US court as incorporated in the 1978 Act continued under the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) of 2005. The 2005 Act heavily affected consumer (i.e. personal) bankruptcies (Altman and Hotchkiss, 2006). Therefore, this longer time frame is suitable for the purpose of my study where I consider US manufacturing firms that file for bankruptcy (Chapter 7 for liquidation and Chapter 11 for reorganization).

In addition, I included only publicly listed firms. This is for the convenience of collecting all financial data. Further, I included only firms that filed in the US bankruptcy

courts as the bankruptcy laws differ from nation to nation. Additionally, I included firms that are large sized (i.e. have more than hundred employees). This allowed me to control for "the liability of smallness" which is one of the main reasons for firm failure. Also, I included only manufacturing firms. Finally, I tried to focus on a single industry. However, I did not get sufficient number of bankrupt firms for any of the four-digit SIC levels. Finally, I found a sufficient number of bankrupt firms in the Chemical and allied products industry (two-digit SIC of 2800). Out of the total number of bankrupt firms, I excluded firms that do not have publicly available financial data (10-K reports) for the six years prior to the year of bankruptcy filing. Additionally, I excluded firms that filed for bankruptcy a second time, a third time or a fourth time. Firms that file for bankruptcies multiple times may have traits that differ from firms that file for bankruptcy only once. Further, I excluded firms that filed for bankruptcy "intentionally". Intentional bankruptcies are called "strategic bankruptcies" (Delaney, 1992). Such firms can be the focal theme of a different research paper. For each of the included firms, I listed down the primary and the secondary NAICS[1] and SIC codes.

After completing stage 1, I created the comparison sample of matched surviving firms by following these steps. First, for each bankrupt firm, I identified a single matched surviving firm. In the fifth year before bankruptcy (i.e. for year t-5 where t is the year of bankruptcy filing), I used the matching criteria of: (1) the same 4-digit SIC code, (2) the same product-market presence, (3) roughly the same sales volume as the bankrupt firm, and (4) firm size (measured by the total number of employees). These criteria are mainly based on prior studies on organizational decline that have used a matched pair design (Hambrick and

[1] NAICS stands for North American Industry Classification System.

D'Aveni, 1988; D'Aveni, 1989a; Daily, 1996; Daily and Dalton, 1994a). In addition, I also ensured that financial data are available for each of these firms in available and established databases. For the matching process, I wrote a simple computer program in Microsoft Visual Basic 6.0 using a Microsoft Excel Macro (Refer Appendix 1 for the detailed algorithm of this program). Finally, I arrived at the dataset that includes thirty six bankrupt firms and thirty six surviving firms in the US chemical and allied products industry (SIC: 2800). This dataset includes data on each firm for each of the five years immediately preceding the bankruptcy filing by the bankrupt firms. In other words, the dataset includes data from t-5 to t-1 where t0 is the year of bankruptcy filing.

Many prior scholars have used a matched pair sample design (D'Aveni, 1990, Hambrick and D'Aveni, 1992, Daily and Dalton, 1994a). The main advantage of such a matched pair design is that the sample provides controls for confounding factors, such as: industry conditions and positions of the firms within the industry (D'Aveni, 1989a). Also, in many cases, such as bankruptcy studies, it makes sense to use a matched pair sample design because bankruptcy is a rare phenomenon (Daily, 1996). The costs and availability of data prohibit large random samples in these cases (Zmijewski, 1984). One disadvantage of the matching design is that it involves sampling on the dependent variable (Berk, 1983 as cited in D'Aveni and MacMillan, 1990: 641). However, in this study, the matched pair design does not involve sampling on the dependent variable. Here, I am not predicting bankruptcy. The dependent variables in this study are the total research and development (R&D) spending of each firm and the number of patents applied by each firm in the US Patent and Trademarks Office (USPTO). Therefore, in this study, the matched pair design allows to conveniently

create two comparative groups for analyses: the group of bankrupt firms and the group of surviving firms that are similar.

7.2 Context

All the firms in the dataset belong to the Chemical and allied products industry (SIC 2800). At the four digit SIC level, this dataset includes fifteen bankrupt firms and fifteen matched surviving firms in SIC 2834 (Pharmaceutical preparations), three bankrupt firms and three matched surviving firms in SIC 2835 (Diagnostic substances), eight bankrupt firms and eight matched surviving firms in SIC 2836 (Biological Products, Except Diagnostic Substances), three bankrupt firms and three matched surviving firms in SIC 2810 (Industrial inorganic chemicals), three bankrupt firms and three matched surviving firms in SIC 2820 (Plastic materials, synthetic resins, synthetic rubber, cellulose, and other manmade fibers, except glass), two bankrupt firms and two matched surviving firms in SIC 2840 (Soap, detergents, cleaning preparations, perfumes, cosmetics, and other toilet preparations), one bankrupt firm and one matched surviving firm in SIC 2860 (Industrial organic chemicals) and one bankrupt firm and one matched surviving firm in SIC 2890 (Miscellaneous chemical products). For a detailed look at the declining or failing firms in this dataset, refer: Appendix 2.

All the industries included are mature. They are also heavily regulated. The pharmaceutical industry has the maximum number of firms in the dataset. This industry is highly research-intensive (PhRMA, 2013, www.phrma.org) and very strictly regulated by the US Food and Drug Administration (USFDA). It takes on average nine to sixteen years to discover a new drug. There are at least five distinct stages in the drug development process (LaMattina, 2009): (1) candidate identification (three to five years), (2) preclinical studies

(one year), (3) Phase 1 (one year), (4) Phase 2 (twelve months to thirty months), and (5) Phase 3 (two to five years).

While the complexity and time demands of the research cycle indicate that changes in R&D investments might exhibit strong inertia over a five year period, there have been trends in the industry that have influenced shifts in R&D regimes.

First, there has been a large scale shift to generics over the period of the study. By 2012, 84% of all prescriptions were filled with generics (PhRMA, 2013). The shift towards generic drugs began with passage of the Waxman-Hatch Act (1984). This act (1984) changed the entry requirements for generic drugs. This act permitted introduction of generic substitutes more quickly, and therefore drastically reduced the time period during which a drug is protected by patent and can command premium pricing (Jacob and Kwak, 2003).

Second, there has been a shift towards biological products. New technological advancements in the pharmaceutical industry are increasingly driven by advances in biology, and nanotechnology (Allarakhia and Walsh, 2011). The pharmaceutical industry experienced a radical technological transformation with the advent of biotechnology based on genetic engineering, genomics, and other novel research (Rothaermel and Hess, 2007). The first new biotechnology drugs reached the market in the 1980s (Hoang and Rothaermel, 2010). As a result, there has been a shift from traditional chemistry-based drug discovery to drug discovery based on multiple disciplines especially the interaction of biology and chemistry (Athreye and Godley, 2009).

In sum, this industry provided an opportunity to study firm decline and failure in a mature industry that has a strong tradition of research and development, and faces pressures

for change in both the political/economic domain (the desire for cheaper, generic drugs) and in the technological domain (the shifts away from chemical formulations to biological formulation).

7.3 Measures

In this study, the two dependent variables are: (1) a natural logarithm of the research and development (R&D) expenditure[2] of each firm in each of the five years in the sample, and (2) the patent count of each firm in each of the five years in the sample. I collected data on the R&D expenditure in US dollars from the annual reports and the COMPUSTAT files. And, I collected data on patent count from the website of the US Patents and Trademarks Office.

The independent variables in this study are: (1) firm type (bankrupt or survivor), (2) time (measured by the number of years before bankruptcy), (3) organizational slack, and (4) the interaction of time to bankruptcy (measured in years) and organizational slack.

For the first independent variable: firm type, I used a categorical variable that acts as an indicator of the firm type. It takes a value of 1 if the firm is a survivor. And, it takes a value of 0 if the firm is a bankrupt. I measured the second independent variable, time by using a dummy variable for four of the five years (t-5 to t-2 where t0 is the year of bankruptcy filing) included in the dataset[3]. And, I created the following dummy variables: (1)

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[2] I use a natural logarithm of R&D spending because this has commonly been used by prior scholars (Leiponen, 2012). I also use a logged value of R&D spending because when a variable is a positive large integer dollar amount, the log is often taken. Also, taking logs narrows the range of the variable. This makes estimates less sensitive to extreme observations (Woolridge, 2006).

[3] I do not include a dummy variable for the year t-1 because that will make the regression model perfectly collinear (Woolridge, 2006).

a dummy variable for year t-5 where t is the year of bankruptcy filing. This variable takes a value of 1 when the year is t-5. For all other years, it takes a value of 0; (2) a dummy variable for year t-4; (3) a dummy variable for year t-3; and a (4) a dummy variable for year t-2[4].

For organizational slack, I used the total slack and each of the three types of slack: available, absorbed and potential. Here, I measured unabsorbed or available slack as quick assets (i.e. cash and marketable securities)/liabilities (Singh, 1986; Greve, 2003). Additionally, I measured absorbed or recoverable slack as Selling, general and administrative expenses/Total revenues (Chen and Hambrick, 1995; Smith, Grimm, Gannon and Chen, 1991). I, then, measured potential slack as price-to-earnings ratio (Combs and Ketchen, 1999). This ratio is an indicator of a firm's ability to raise capital in equity markets. When investors share optimism concerning a firm's future, share prices are bid up, making capital easier to raise. Finally, I summed up the values of the three different types of organizational slack in order to arrive at the total slack. The units of each of these variables are US dollars. Again, I collected these data from COMPUSTAT files and from the annual (10-K) reports of these firms. For each of these slack types (total, available, absorbed and potential), I used a natural logarithm of the original values[5].

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[4] I create a separate dummy variable for each of the years because this will then allow each year to have a different effect on the dependent variable. Therefore, the difference in effect of year t-5 and the year t-4 need not be the same as the difference in effect of year t-4 and t-3 where t0 is the year of bankruptcy filing (Woolridge, 2006).

[5] I use a natural logarithm of the total organizational slack and each of the three types of organizational slack because we can then ignore the units of measurement of the variables. Additionally, taking a natural logarithm narrows the range of the variables. This increases the sensitivity of the regression models toward extreme observations (Woolridge, 2006:199).

Finally, for the interaction variables, I just created variables that are the interaction of logged values of total slack, available slack, absorbed slack and potential slack and the dummy variables for each year. In addition, I controlled for the large study period by including a categorical variable for each decade. This variable takes a value of 1 where the calendar year is the 1990s. It takes a value of 2 where the calendar year is the 2000s. And it takes a value of 3 where the calendar year is the 2010s[6].

7.4 Methods

Hypothesis 1a proposes that the R&D expenditure of declining firms will be less than the R&D expenditure of matched surviving firms in each of the five years immediately preceding bankruptcy of declining firms. In contrast, Hypothesis 2a proposes that the research and development (R&D) expenditure of declining firms will be more than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms. In order to empirically examine these two hypotheses, for each of the years: t-5, t-4, t-3, t-2 and t-1, I conducted t-tests to check for the differences in the mean values of: R&D expenditure. I used the Stata 12 command ttest [var], by(firm type) unequal. Here firm type is of two categories: (1) bankrupts, and (2) survivors. I used the unequal option because the two groups of firms: bankrupts and survivors have unequal variances of R&D expenditure[7].

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[6] This variable controls for the macro effects of the decades, such as the economic conditions. It takes into consideration the aggregation of the fixed year effects for each decade.

[7] I tested for the equality of the variances of R&D expenditures of the two groups of firms: bankrupts and survivors. I conducted variance ratio tests using the Stata 12 command sdtest [variable name], by [group variable name]. I found that for each of the five years in the sample (from t-5 to t-1), the variance of R&D expenditure of bankrupt firms is less than the variance of R&D expenditure of survivor firms.

Hypothesis 1b proposes that the patent count of declining firms will be less than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms. In contrast, Hypothesis 2b proposes that the patent count of declining firms will be more than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms. I empirically tested these two hypotheses by running two-sample t-tests with unequal variances. I used the unequal variance option because the two groups of firms: bankrupts and survivors have unequal variances.

Over and above the empirical testing for Hypotheses 1a, 1b, 2a and 2b, I also performed two-sample t-tests with unequal variances on total slack, available slack, recoverable or absorbed slack and potential slack. I conducted these additional tests in order to examine the amounts of total slack and each type of slack in declining firms relative to the amounts of total slack and each type of slack in surviving firms.

Hypothesis 3a proposes that the R&D expenditure of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing. In contrast, Hypothesis 4a proposes that the R&D expenditure of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing. In order to empirically examine these two hypotheses, I conducted two-sample t-tests only for bankrupt firms comparing the mean R&D expenditure of two consecutive years. There are four sets of comparisons involved here: (1) the mean R&D expenditure of bankrupt firms in the year t-5 versus the mean R&D expenditure of bankrupt firms in the year t-4, (2) the mean R&D expenditure of bankrupt firms in the year t-4 versus the mean R&D expenditure of bankrupt firms in the year t-3, (3) the mean R&D expenditure of bankrupt firms in the year t-3 versus the mean R&D expenditure of bankrupt firms in the year t-2, and (4) the mean R&D

expenditure of bankrupt firms in the year t-2 versus the mean R&D expenditure of bankrupt firms in the year t-1.

Hypothesis 3b proposes that the patent count of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing. Hypothesis 4b offers a contrasting perspective to Hypothesis 3b. Hypothesis 4b proposes that the patent count of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing. Similarly as in the case of testing Hypotheses 3a and 4a, I conducted two sample t-tests with the unequal variance option to compare the mean patent counts of bankrupt firms from each year to the next. As before, there are four sets of comparisons: from year t-5 to t-4, t-4 to t-3, t-3 to t-2 and t-2 to t-1 where t0 is the year of bankruptcy filing.

In addition to these, I also conducted exploratory analyses to empirically examine the effect of time to bankruptcy on the search routines of declining firms versus the search routines of surviving firms. I conducted regression analyses using mixed models on panel data using the xtmixed command in Stata 12. In this model, time (i.e. t-5, t-4 t-3, t-2 and t-1) is treated as an independent categorical variable. I used the raw values of R&D expenditure as the dependent variable. I then computed the predicted mean of R&D expenditure for each calendar year. Next, I tested for the overall null hypothesis that the average R&D expenditure is not the same across all years. I tested this using the contrast [variable] command in Stata 12. I also conducted tests of year-to-year comparison of the average predicted R&D expenditure using the contrast ar.[variable name] command in Stata 12. Using the same set of commands I tested for the interaction effect of annual calendar time and the type of the firm,

bankrupt or survivor. However, I added the interaction of firm type and time to bankruptcy as an independent variable in the above set of Stata 12 commands.

Hypothesis 5a proposes that the R&D expenditure of all firms will have a non-linear (i.e. logarithmic) relationship with organizational slack (total slack, available slack, recoverable slack and potential slack). In order to empirically examine this hypothesis, I performed panel regressions with random effects. The final dataset is a strongly balanced panel. The panel variable is the firm's unique serial number (i.e. identifier) and the time variable is the year relative to bankruptcy filing (i.e. t-5, t-4, t-3, t-2 and t-1). The random effects model is suitable here because it uses a weighted matrix of the between effect and the fixed effect models. It allows this model to account for variables that do not vary over time (for e.g. firm type is a bankrupt or a survivor) as well as variables that do not vary within the same firm (for e.g. in some cases the levels of slack do not vary over time in the same firm). In order to run the panel regression models, I used the following Stata command: xtreg [dependent var] [independent var1 independent var2 ….], re vce (cluster [cluster id]). I tested for the suitability of random effects by using the following postestimation command in Stata: xttest0. I tested for serial correlation using the user written Stata 12 command: xtserial. I tested for heteroskedasticity by first running xtgls [dependent var] [independent var1 independent var2 ….], igls panels(heteroskedastic). Then I ran a normal xtgls [dependent var] [independent var1 independent var2 ….] i.e. without the panel option. Then, I conducted a likelihood ratio test (using the Stata command lrtest) comparing the heteroskedastic model with the homoskedastic model. Finally, I ran a panel regression with random effects with the vce(cluster) option in order to correct the standard errors for hetroskedasticity and autocorrelation. I also used the vce(cluster) option by using the clustering on a pair of a

single bankrupt and its single matched surviving firm. This allows for the comparison to be a matched pair comparison. I performed separate regression analyses for total slack, available slack, absorbed slack and potential slack.

The first part of Hypothesis 6a proposes that the R&D expenditure of all firms will be a function of the interaction of the amount of organizational slack of the firms and the time to bankruptcy. Even after controlling for these interaction effects, the R&D expenditure of declining firms will be lower than those of surviving firms. Again, I ran panel regression models with the vce(cluster option). I checked for serial correlation using the xtserial command in Stata 12. And I checked for heteroskedasticity using the xtgls heteroskedastic model and the xtgls normal model. Then, I compared these two models using the lrtest in Stata 12. In these models, the dependent variable is the logged value of R&D expenditure and the independent variables are: dummy variables for years (t-5 to t-2), organizational slack and the interaction of organizational slack and year dummies. As before, I ran separate models for total slack, available slack, absorbed slack and potential slack.

The second part of Hypothesis 6a proposes that the patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the patent count of declining firms will be lower than those of surviving firms. In order to empirically test this hypothesis, I used the Stata 12 command of xtnbreg [dependent variable] [independent variable1, independent variable2, ….].

Hypothesis 5b proposes that the patent count of all firms will have a non-linear (i.e. logarithmic) relationship with organizational slack (total slack, available slack, recoverable

slack and potential slack). In order to empirically examine this hypothesis, I conducted a panel count regression model with random effects. Since the dependent variable (patent count) is a non-negative, integer count variable, the traditional choices of methods are the Poisson regression and the negative binomial regression (Hausman, Hall and Griliches, 1984). Here, I conducted negative binomial regression using the Stata command of xtnbreg. I performed negative binomial regression because there is overdispersion in the data (i.e. variance/mean of patent count is about 14.65). The standard errors of Poisson quasi maximum likelihood estimates (QMLE) are robust to arbitrary patterns of serial correlation (Woolridge, 1997; Wu, 2012). The negative binomial QMLE has the same robustness properties of the Poisson QMLE (Woolridge, 2002:737). Therefore, the standard errors of the regression models that I conducted are robust to serial correlation and heteroskedasticity (Czarnitzki, Hussinger and Schneider, 2011:1422; Woolridge, 2002).

The first part of Hypothesis 6b proposes that the R&D expenditure of all firms will be a function of the interaction of the amount of organizational slack of the firms and the time to bankruptcy. Even after controlling for these interaction effects, the R&D expenditure of declining firms will be higher than those of surviving firms. I, test this part of the hypothesis in exactly the same way as I have tested the first part of Hypothesis 6a.

The second part of Hypothesis 6b proposes that the patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the patent count of declining firms will be higher than those of surviving firms. I, empirically examine this part of the hypothesis using the same commands that I have used for testing the second part of Hypothesis 6a.

CHAPTER 8: ANALYSES AND CONCLUSION

In this chapter, I discuss about the results of the hypothesis tests. I also report results from additional exploratory analyses. Next, I conclude from these analyses. I specifically identify the contributions of this study to the two bodies of literature, organizational decline and organizational routines. At the end, I highlight a few limitations of this study that can be overcome by future researchers.

8.1 Descriptive statistics

Refer Table 8.1 for the descriptive statistics of the main variables of this study. Here, recoverable slack has a very high correlation (0.97) with total slack. This is probably because total slack is a summed up value of available slack, recoverable slack and potential slack. Again, log value of potential slack has a high correlation (0.81) with log value of total slack. This is again probably because of the fact that potential slack measure is included while computing total slack. Even when there is high correlation between the slack types, I test for the effects of total slack and each type of slack because prior researchers have reported different effects of each type of slack on change initiatives, innovation and search (Voss, Sirdeshmukh and Voss, 2008; Geiger and Cashen, 2002; Iyer and Miller, 2008).

8.2 Analyses of Hypotheses 1a and 2a

Hypothesis 1a and Hypothesis 2a offers contrasting propositions. Based on the threat rigidity perspective (Staw, Sandelands and Dutton, 1981), Hypothesis 1a proposes that the research and development (R&D) expenditure of declining firms will be less than the

research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms. Based on the behavioral theory of a firm (Cyert and March, 1963), Hypothesis 2a proposes that the research and development (R&D) expenditure of declining firms will be more than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.

The results of the two sample t-tests with unequal variances indicate that in all the five years considered here (from t-5 to t-1), bankrupt firms have lower amounts of R&D expenditure than their corresponding surviving firms (Table 8.2). However, for the years t-5, t-4 and t-3, this difference is weakly statistically significant (i.e. significant only at the 10% level). For the years, t-2 and t-1, this difference is strongly statistically significant (i.e. significant at the 5% level). Therefore, Hypothesis 1a is supported. But, Hypothesis 2a is not supported. This indicates that confirming the predictions of the threat rigidity perspective, declining firms within this dataset engage in fewer search routines than their matched surviving counterparts.

According to the threat rigidity theory, the threat of bankruptcy leads managers of declining firms to narrow their field of attention and decrease search routines (Staw, Sandelands and Dutton, 1981). The results of this study support Hypothesis 1a and agree with the threat rigidity hypothesis.

The results of this test support previous studies which find that declining firms employ cutback strategies in R&D expenditures (Arogyaswamy and Yasai-Ardekani, 1997; Hambrick and Schecter, 1983). Declining firms spend less on R&D because they have

accelerating cost problems (D'Aveni, 1989a). Organizational decline leads managers of declining firms to increase job standardization and to increasingly use existing routines (Cameron, 1983; Sutton and D'Aunno, 1989; D'Aunno and Sutton, 1992). Turnover of personnel is a common phenomenon within declining firms (Greenhalgh, 1983; Greenhalgh and Rosenblatt, 1984) and such turnover of key personnel (Aime, Johnson, Ridge and Hill, 2010) may lead to contraction of existing organizational routines.

8.3 Analyses of Hypotheses 1b and 2b

Hypothesis 1b and Hypothesis 2b use patent counts to test the two contrasting theories. Based on the threat rigidity perspective (Staw et al., 1981), Hypothesis 1b proposes that the patent count of declining firms will be less than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms. In contrast, based on the behavioral theory of a firm perspective (Cyert and March, 1963), Hypothesis 2b proposes that the patent count of declining firms will be more than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.

The results of the t-tests indicate that the number of patents for bankrupt firms is less than that for surviving firms in the years t-2 and t-1 i.e. in the two years immediately prior to bankruptcy filing (Refer: Table 8.3). However, in the years t-5, t-4 and t-3, there is no statistically significant difference in the number of patents for bankrupt firms and that for surviving firms. This provides partial support for Hypothesis 1b and no support for Hypothesis 2b. Hence, these results also support the threat rigidity hypothesis. This implies that relative to their matched surviving firms, declining firms patent less in the two years immediately prior to their bankruptcy filing.

One of the probable reasons why declining firms patent less in the two years immediately preceding bankruptcy is that declining firms employ cutback management by terminating patenting programs and scaling down operations (Levine, 1979). Under decline conditions, the focus is more on efficiency improvement and less on trying out new things, such as: new patents, new products and new processes (Flynn and Farid, 1991). Also, declining firms conserve on their resources by employing cost-cutting strategies (Sutton and D'Aunno, 1989). Since patenting is a costly activity, managers of declining firms reduce their patenting in the two years immediately preceding their bankruptcy filing.

The results for both measures of search routine (research and development expenditures and patents counts) suggest that the threat-rigidity hypothesis has its strongest effect in the two years immediately preceding bankruptcy. The tests for the earlier phase are equivocal, in that they are only weakly significant for R&D and they are not significant for patent count data.

8.4 Analyses of Hypotheses 3a and 4a

Hypotheses 3 and 4 offer propositions about the changes in search routines during the five years preceding bankruptcy for the failed firms. Hypothesis 3a proposes, in fit with the threat rigidity theory perspective (Staw et al. 1981), the R&D expenditure of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing. In contrast, Hypothesis 4a proposes that as suggested by the behavioral theory of the firm (Cyert and March, 1963), the R&D expenditure of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.

The results of the t-tests indicate that the averages of R&D expenditure of bankrupt firms do not statistically significantly differ from each other in the consecutive years (Table 8.4). In other words, the average R&D expenditure of bankrupt firms in the year t-5 does not statistically significantly differ from the average R&D expenditure of bankrupt firms in the year t-4. Again, the average R&D expenditure of bankrupt firms in the year t-4 does not statistically significantly differ from the average R&D expenditure of bankrupt firms in the year t-3. Similarly, the average R&D expenditure of bankrupt firms in the year t-3 does not statistically significantly differ from the average R&D expenditure of bankrupt firms in the year t-2. Finally, the average R&D expenditure of bankrupt firms in the year t-2 does not statistically significantly differ from the average R&D expenditure of bankrupt firms in the year t-1. These results indicate no support for both the hypotheses. Neither Hypothesis 3a nor Hypothesis 4a is supported, though the results do signal inertia in research and development, which is in keeping with some descriptions of rigidity.

Interestingly, the lack of significant change in R&D expenditure of declining firms seems to suggest that the passage of time towards bankruptcy filing does not accelerate deterioration in research routines within these firms. This is contrary to the evidences found by prior scholars of accelerating deterioration within declining firms (Daily, 1996; Hambrick and D'Aveni, 1988). As noted, though, the threat rigidity theory does suggest that managers within declining firms stick to their existing routines and to their well-learned dominant responses. This seems to indicate that such declining firms need not change their search routines at all. Helfat (1994) found that some of the R&D activities in petroleum refinery involve incremental change in R&D spending while some other R&D activities have fixed R&D with hardly any change over the years. The results of no change in search routines of

declining firms seem to support the perspective that organizational search routines are stable (Cyert and March, 1963; March and Simon, 1958).

D'Aveni (1989a) identified three distinct patterns of firm decline: sudden decline, gradual decline and lingering. Firms following each pattern of decline failed at a different pace. The results here do not show a pattern of sudden decline or gradual decline in the research routine. The results are more in keeping with the "lingering" process. The firms maintain research and development to the final year.

Hambrick and D'Aveni (1988) found that declining firms follow a downward spiral. In the last stage of decline, just three years before bankruptcy filing, the environmental carrying capacity and slack amounts declined abruptly (Hambrick and D'Aveni, 1988). However, contrary to Hambrick and D'Aveni's (1988) findings, I do not find any faster deterioration in search routines within declining firms in the three years immediately preceding their bankruptcy filing. The non-support of accelerating deterioration within declining firms seems to support the viewpoint that organizational search routines are relatively resistant to change (Cohen and Bacdayan, 1994).

Some prior evidences indicate that declining firms have fewer top managers with R&D expertise (D'Aveni, 1989a). Typically powerful groups in declining firms play the role of a selection mechanism (Loch, Sengupta and Ahmad, 2013). As we might expect that researchers have status and power in the organizations within the chemical and allied products industry (especially in pharmaceutical organizations that constitute the majority of the sample), the persistence of R&D expenditure may be an industry effect here.

8.5 Analyses of Hypotheses 3b and 4b

Hypothesis 3b and 4b rely on the patent count of declining firms to test the alternate predictions of the threat-rigidity perspective and the behavioral theory of the firms. Hypothesis 3b proposes a decrease in the patent count from each year to the next in the last five years prior to bankruptcy filing while Hypothesis 4b proposes an increase in the patent count.

The results of the t-tests do not support Hypothesis 3b (Table 8.5). These results also do not support Hypothesis 4b. There are no statistically significant differences in the average number of patents applied by the bankrupt firms in the comparison from each year to the next year of the five years included in the dataset. As with the results reported for R&D, the results of patent count comparisons across time suggest inertia, which could be taken as support for the threat rigidity perspective (Staw et al., 1981). Managers of declining firms seem to undertake no change in their patenting activities even when failure is imminent. As again, the passage of time in the last five years prior to bankruptcy filing do not seem to have any effect on the search routines of declining firms.

No change in existing activities and organizational routines are indications of the presence of rigidity behavior. Prior scholars (Greenhalgh, 1983; Greenhalgh and Rosenblatt, 1984) have found that managers within declining firms are resistant to change. Yet, these results, when viewed in concert with the previous results, give some reasons to wonder if threat is the cause of the inertia (recall that, in comparison to matched pairs of surviving firms, the failed firms were quite similar in the early years of the decline process). The tests of the role of slack and the interaction of time and slack may give further insight into the failure process.

8.6 Analysis of Hypothesis 5a

Hypothesis 5a proposes that the R&D expenditure of all firms will have a non-linear (i.e. logarithmic) relationship with four measures of organizational slack: total slack, available slack, recoverable slack and potential slack. The results differ for the types of slack.

The results of the panel regression model (model 1 in Table 8.6) indicates that log value of total slack does not significantly affect the log value of R&D expenditure of all firms. However, the log value of available slack statistically significantly affects the log value of R&D expenditure of all firms (model 2 in Table 8.6). The coefficient on the variable: log value of available slack indicates that a 1% increase in available slack leads to a 0.111% increase in R&D expenditure even after controlling for other factors. But, the log value of absorbed slack does not statistically significantly affect the log value of R&D expenditure of all firms (model 3 in Table 8.6). Again, the log value of potential slack statistically significantly affects the log value of R&D expenditure of all firms (model 4 in Table 8.6). The coefficient on the variable: log value of potential slack indicates that a 1% increase in potential slack results in a 0.102% increase in R&D expenditure even after controlling for other factors. However, this effect is weakly statistically significant (i.e. significant only at the 10% level). Therefore, overall Hypothesis 5a is partially supported. This hypothesis is supported for available slack and potential slack.

The first three regression models (models 1 to 3 in Table 8.6) suggest that when controlling for total organizational slack, the R&D expenditure of declining firms significantly differs from the R&D expenditure of matched surviving firms. The coefficient on the variable: survivor indicator in model 1 suggests that compared to a declining firm, a matched surviving firm will lead to an increase of 98.6% of R&D expenditure, after

controlling for the presence of total slack. Similarly, the coefficient on the variable: survivor indicator in model 2 suggests that relative to a declining firm, a matched surviving firm will lead to an increase of 87.1% of R&D expenditure, after controlling for the presence of available slack. Finally, the coefficient on the variable: survivor indicator in model 3 suggests that compared to a declining firm, a matched surviving firm will lead to an increase of 103.8% of R&D expenditure, after controlling for the presence of absorbed slack. However, after controlling for potential slack (model 4 in Table 8.6), the R&D expenditure of declining firms and that of matched surviving firms do not significantly differ from each other. The results of these tests indicate that at least available slack and potential slack stimulates search in declining firms as well as in surviving firms. However, the differences in search routines between declining firms and surviving firms remain significant when controlling for available slack. This implies that even when available slack stimulates search in declining firms and in surviving firms, it cannot account for the differences in search routines of these two groups of firms. This may be because available slack levels differ in these two groups of firms. In additional exploratory analyses that I present in this chapter (after the section on hypotheses testing), I found that available slack is significantly less in declining firms when compared to surviving firms in the last year before bankruptcy. The results of this study may also be because available slack is used differently in declining firms and in surviving firms. However, this issue needs further examination in the future.

The first type of slack: available slack can be put to use immediately because it includes uncommitted resources (Bourgeois and Singh, 1983). The second type of slack, absorbed slack (also called recoverable slack) requires time and effort in order to be recovered (Bourgeois and Singh, 1983). And, the third type of slack: potential slack refers to

the ability of the firm to raise extra resources from the environment, such as through borrowing (Bourgeois and Singh, 1983).

Prior evidences on the effects of organizational slack are mixed. Some evidences point to the beneficial effects of organizational slack (Barker and Duhaime, 1997; Audia and Greve, 2006). In contrast, some evidences point to the negative effects of slack (Latham and Braun, 2009). Finally, some evidences bridge the two "slack as beneficial" and "slack as inefficient" perspectives by suggesting a non-linear (typically an inverted U-shaped relationship) between slack and change activities, slack and innovation and slack and risk-taking (Nohria and Gulati, 1996; Wiseman and Catanach, 1997).

The results presented here provide a complex picture. Available slack does help firms increase R&D, especially in the early years of decline. These results, combined with the earlier analysis of R&D, suggest that generally firms do have slack early on, but the surviving firms make more productive use of that slack.

Though I do not test directly to learn how slack is used, I suspect that available slack can be employed for local search activities. For example: available cash can be used to improve upon the existing organizational routines. Potential slack can be used to increase search activities. For example, funds borrowed from the external market can be used to support R&D initiatives that will tap into new markets. Also funds borrowed from the external market may be used to feed into research projects that are financially hard pressed. Funds borrowed from the external market can also be used to feed into projects that take long time to recover their costs.

8.7 Analysis of Hypothesis 5b

Hypothesis 5b proposes that the patent count of all firms will have a non-linear (i.e. logarithmic) relationship with organizational slack (total slack, available slack, absorbed slack and potential slack).

The results of the patent count regression indicate that the log value of total slack statistically significantly affects the patent count of all firms (model 5 in Table 8.7). Again, the results indicate that the log value of available slack statistically significantly affects the patent count of all firms (model 6 in Table 8.7). But, the log value of absorbed slack does not significantly affect the patent count of all firms (model 7 in Table 8.7). Again, the log value of potential slack statistically significantly affects the patent count of all firms (model 8 in Table 8.7). Therefore, Hypothesis 5b is partially supported. This hypothesis is not supported for absorbed slack. However, it is supported for all other types of slack and total slack. These results are similar to those reported for R&D.

Specifically, the coefficient on the log value of total slack (model 5) suggests that if total slack increases by 1% then the number of patents will increase by 0.157%. The coefficient on the log value of available slack (model 6) suggests that if available slack increases by 1% then the number of patents will increase by 0.154%. And, the coefficient on log value of potential slack (model 8) suggests that if potential slack increases by 1% then the number of patents will increase by 0.282%. The coefficient on survival indicator in Model 5 in Table 8.7 indicates that a surviving firm patents 2.94 times that of a bankrupt firm when controlling for total slack. However, after controlling for available slack, recoverable slack and potential slack the patenting behavior of bankrupt firms do not significantly differ from that of surviving firms. This seems to suggest that slack-induced search offers a suitable

explanation of patenting activities. Here (Table 8.7), I have also presented the model fit statistics Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) values. Lower values of AIC and BIC indicate better model fit (Cameron and Trivedi, 1998). As per the AIC and the BIC values, the model with the log value of potential slack (Refer: model 8) is the best fit among these models.

These results might imply that available slack, such as excess cash, can be used to cover for patenting fees. Potential slack, such as external funds, can be used to feed into projects that take a longer time to patent. The results here support the behavioral theory argument that organizational slack buffers the core of the organization. Such slack can be used to stimulate search for new products through patenting.

8.8 Analyses of Hypothesis 6a and 6b

Hypothesis 6a proposes the interaction effect of organizational slack and the passage of time to be significant on the R&D expenditure of all firms. It further proposes that even after controlling for these interaction effects, the R&D expenditure of declining firms will be lower than those of surviving firms. In contrast, Hypothesis 6b proposes that there will be significant interaction effect of organizational slack and the passage of time on the R&D expenditure of all firms, but after controlling for these interaction effects, the R&D expenditure of declining firms will be higher than those of surviving firms.

The results of the panel regression models indicate that the log value of total slack interacts with the year t-4 (model 9 in Table 8.8). This interaction effect statistically significantly affects the log value of R&D expenditure of all firms. However, the interactions of the other years in the sample with the total slack do not statistically significantly affect the

log value of R&D expenditure. Even after controlling for the interaction effects, the log value of R&D expenditure significantly differs in declining firms and surviving firms. The coefficient on the variable: survivor indicator (model 9) suggests that compared to a declining firm, a surviving firm increases the R&D expenditure by about 96.3% even after controlling for total slack and its interaction with each calendar year. Therefore, the first part of hypothesis 6a is partially supported for total slack.

The results of the panel regression models suggest that the interaction of the log value of available slack and any of the years in the sample are not statistically significant (model 10 in Table 8.8). However, after controlling for these interaction effects, the log value of R&D differs significantly in declining firms and surviving firms. The coefficient on the variable: survivor indicator suggests that compared to a declining firm, a matched surviving firm increases R&D expenditure by about 86.5% even after controlling for the presence of available slack and the interaction of available slack with each calendar year.

The results of the panel regression models indicate that the interaction effects of the log value of absorbed slack and the years in the sample are not statistically significant (model 11 in Table 8.8). But, even after controlling for these interaction effects, the log value of R&D expenditure significantly differs in declining firms and their matched survivors. The coefficient on the variable: survivor indicator suggests that compared to a declining firm, a surviving firm leads to an increase in R&D expenditure by about 102.2%.

Additionally, the panel regression results indicate that the interaction effects of potential slack and each of the years t-5, t-4 and t-3 statistically significantly affect the log R&D expenditure of all firms (model 12 in Table 8.8). Interestingly, after controlling for

these interaction effects, the log R&D expenditure of declining firms do not seem to significantly differ from the log R&D expenditure of matched surviving firms. The regression coefficients in model 12 (Table 8.8) indicates that in year t-5, 1% increase in potential slack leads to 0.573% increase in R&D expenditure. In year t-4, 1% increase in potential slack leads to 0.684% increase in R&D expenditure. And, in year t-3, 1% increase in potential slack leads to 0.602% increase in R&D expenditure. Therefore, the first part of Hypothesis 6a is partially supported for potential slack.

The passage of time towards bankruptcy is significant, in the presence of some forms of slack; for example, potential slack, such as access to external sources of fund is significant in expanding R&D activities. Therefore, the results seem to suggest here that potential slack is especially important in the years t-5, t-4 and t-3. In the years t-2 and t-1, the bankruptcy may be too near. Managers of declining firms are then not likely to tap into external funds anymore. However, managers of declining firms still retain hope of improving their deteriorating conditions in the years t-5, t-4 and t-3. That is why, in those years they may be relying more on potential slack for their R&D activities. Put differently, threat does not appear to be an issue in early years. Given this finding, the explanation for less change in years t-2 and t-1 might be attributed to fewer resources (a contextual cause) rather than threat (a psychological cause). In additional exploratory analyses, I found that the available slack levels of declining firms are significantly lower than those of surviving firms in the year before bankruptcy.

High level of potential slack allows declining firms to delay their bankruptcy (Balcaen, Manigart and Ooghe, 2011). D'Aveni (1989b) found that unused borrowing capacity (i.e. potential slack) is very important because unused borrowing capacity and the

prestige of top level managers together allows declining firms to delay bankruptcy. Loss of potential slack often leads firms to file for bankruptcy (Donoher, 2004). The results of this study support these findings.

D'Aveni and MacMillan (1990) found that managers of declining firms pay more attention to internal resources and internal environment. At the same time they neglect the external resources and the external environment. Contrary to D'Aveni and MacMillan (1990), I find that managers of firms (including declining firms) place importance on potential slack. Since potential slack involves access to external funds, managers of declining firms pay attention to their external environment as well.

High level of available slack also allows declining firms to delay their bankruptcy (Balcaen, Manigart and Ooghe, 2011; Flynn and Farid, 1991). However, the results of this study here do not support the significant effect of the interaction of available slack and the passage of time towards bankruptcy.

Hypothesis 6a also proposes that the patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. When controlling for these interaction effects, the patent count of declining firms will be lower than those of surviving firms. Hypothesis 6b proposes the patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. When controlling for these interaction effects, the patent count of declining firms will be higher than those of surviving firms.

The panel count regression model results indicate that the interaction of the year t-5 and the log value of total slack statistically significantly affects the patent count of all firms

(model 13 in Table 8.9). However, the interaction of the log value of total slack and any of the other years do not statistically significantly affect the patent count of all firms. Even after controlling for these interaction effects, the patent counts of declining firms significantly differ from the patent counts of surviving firms. A matched surviving firm patents about 2.85 times that of a declining firm. Therefore, the second part of Hypothesis 6a is partially supported for total slack.

The panel count regression model results indicate that the interaction of the years and the log value of available slack do not statistically significantly affect the patent count of all firms (model 14 in Table 8.9). However, after controlling for these interaction effects, the patent count of declining firms do not differ from the patent counts of surviving firms.

The results of the panel count regression model indicate that the interaction of the years and the log value of absorbed slack do not significantly affect the patent count of all firms (model 15 in Table 8.9). However, after controlling for these interaction effects, the patent counts of declining firms do not differ from the patent counts of surviving firms.

The panel count regression model results indicate that the interaction of the year t-5 and the log value of potential slack significantly affects the patent count of all firms (model 16 in Table 8.9). However, the interaction of all other years and the log value of potential slack do not significantly affect the patent count of all firms. Additionally, after controlling for these interaction effects, the patent counts of declining firms do not differ from the patent counts of surviving firms. Considering the model fit statistics (AIC and BIC values), the model with potential slack and its interaction (model 16) is the best fit among these models.

As I have already found before, the patent counts of declining and surviving firms differ significantly only in the years t-2 and t-1. This is one of the reasons why I do not find support for the proposition that the patent counts of declining firms and surviving firms will differ even after controlling for the interaction effects of organizational slack and the annual calendar time. Successful patenting takes years. In the pharmaceutical industry where majority of the firms in the sample come from, it takes about nine to sixteen years to patent. Therefore, only in the year t-5, we still see that managers of firms tap into potential slack, such as external fund sources, in order to patent.

8.9 Summing up the analyses

To sum up the analyses of the hypotheses (Table 8.10), the results of this study offer more support for the threat rigidity perspective (Staw et al., 1981) than the alternative behavioral theory of firm but the results are equivocal, in that the declining firms are somewhat like the surviving firms early on in their decline. The differences become strongly significant in the last two years before failure. Relative to surviving firms, they have less search (R&D and patents) in each of the two years immediately preceding bankruptcy. Interestingly, declining firms do not show evidences of accelerating deteriorations of R&D and patenting over the last five years before bankruptcy. From each year to the next, the R&D expenditure and the patent count does not change within declining firms in the study period (i.e. five years before bankruptcy). This confirms a rigidity perspective of sticking to existing organizational routines and undergoing no change where rigidity is defined as inertia. This is not rigidity as cutback.

The results of this study further suggest that the search routines of all firms have a non-linear (i.e. logarithmic) relationship with available slack and potential slack. However,

no significant relationship is found between recoverable or absorbed slack and the search routines of all firms. This indicates support for the behavioral theory argument of slack-induced search (Cyert and March, 1963). The results of this study also indicate that the search routines of all firms is a function of the interaction of total slack and the early years in the sample (t-4 for R&D expenditure and t-5 for patent counts). Even after controlling for the interaction effects of total slack and the calendar years, the search routines significantly differ in declining firms and surviving firms. Finally, the results of this study indicate that the R&D expenditure of declining firms is a function of the interaction of potential slack and the early years in the sample (t-5, t-4 and t-3). However, after controlling for these interaction effects between potential slack and the calendar years, the search routines of declining firms do not significantly differ from the search routines of their matched surviving counterparts. This seems to imply that use of potential slack is crucial in stimulating search in the early years of decline.

8.10 Examination of the differences in organizational slack

In addition to the empirical examination of the hypotheses, I conducted some exploratory analyses to test for the differences in the amounts of organizational slack in declining firms and surviving firms. The results of the two sample t-tests with unequal variances indicate that the total slack levels of bankrupt firms are weakly statistically significantly lower than those of surviving firms in the years t-4 and t-3 (Table 8.11). The available slack levels of bankrupts are statistically significantly less than those of surviving firms only in the years t-4 and t-1 (Table 8.12). However, the difference is weakly statistically significant in the year: t-4 (i.e. significant only at the 10% level). The amounts of absorbed or recoverable slack of bankrupts do not statistically significantly differ from the

amounts of absorbed slack of survivors for each of the five years preceding bankruptcy (Table 8.13). The potential slack levels of bankrupt firms statistically significantly differ from those of surviving firms in the years t-4 and t-3 (Refer: Table 8.14). However, for the rest of the years included in the database, the potential slack levels of the two groups of firms: bankrupts and survivors do not differ. These differences in the levels of each type of slack might lead to the lack of change in search routines in declining firms in the five years before their bankruptcy filing.

Many prior scholars have found evidences of the presence of low levels of slack within declining firms (Cameron, Whetten and Kim, 1987; Hambrick and D'Aveni, 1988; Wiseman and Bromiley, 1996). The results of this study indicate the presence of lower levels of slack in declining firms than in surviving firms in the years t-4 and t-3 where t0 is the year of bankruptcy filing. Therefore, the results partially agree with the evidences of these prior scholars. At least during the initial years of decline, slack amounts are increased because people and assets involved in some jobs are freed up (Meyer, 1988). This may be one reason why I do not find significant differences in the slack amounts of declining firms and surviving firms in each of the five years in the sample.

The presence of low levels of available slack within declining firms lead managers of such firms to exhibit threat rigidity (Cameron, 1983). In my sample, the presence of low level of available slack in the year t-1 may be leading to the threat rigidity findings. High levels of available slack increase search routines (Geiger and Cashen, 2002; Majumdar and Venkataraman, 1993; Voss, Sirdeshmukh and Voss, 2008). Since surviving firms in my sample have higher amount of available slack in the last year before bankruptcy, I find that the search routines of surviving firms are more than those of declining firms.

Singh (1986) found that well performing firms have increased level of absorbed slack (also called recoverable slack). Contrary to Singh (1986), I do not find any difference in the absorbed slack levels of declining firms and surviving firms. High levels of absorbed slack enhance search routines (Miller, Lant, Milliken and Korn, 1996). However, even in the absence of evidence of differences in the levels of absorbed slack in declining firms and surviving firms, I find that declining firms engage in fewer search routines than surviving firms in the two years before bankruptcy. This might hint at the fact that absorbed slack being difficult to recover is not very useful during the last five years before bankruptcy.

Some prior scholars found that compared to matched surviving firms, declining firms have low levels of potential slack (Beaver, 1966; D'Aveni, 1989a). The results of this study partially support D'Aveni's (1989a) and Beaver's (1966) findings. The differences in potential slack are especially important during the early years of decline when firms are found to be employing potential slack more productively toward search routines.

8.11 Additional analyses on the effects of time

In addition to hypotheses testing, I conducted some exploratory analyses to examine the effects of time on the R&D expenditure of all firms. Further, I conducted empirical tests to examine the effects of the interaction of the time to bankruptcy and firm type (i.e. declining or surviving) on the R&D expenditure of firms. The result of the overall effect of annual calendar year on R&D expenditure is statistically insignificant (for 4 degrees of freedom, the chi-square value is 2.83 and the corresponding p-value is 0.5872). I also tested for the effect of (1) year t-5 versus year t-4 (the z-value is -1.09 and the corresponding p-value is 0.278), (2) year t-4 versus year t-3 (the z-value is 0.38 and the corresponding p-value is 0.706), (3) year t-3 versus year t-2 (the z-value is 0.31 and the corresponding p-value is

0.76), and (4) year t-2 versus year t-1 (the z-value is -1.15 and the corresponding p-value is 0.251). Overall, these results indicate that there is no statistically significant effect of the annual calendar time on the R&D expenditure of all firms.

The result of the overall effect of the interaction of the time to bankruptcy and firm type (i.e. declining or surviving) is weakly significant (for 4 degrees of freedom, the chi-square value is 8.95 and the corresponding p-value is 0.0623). I also tested for the effect of (1) (year t-5 versus year t-4)(declining firm versus surviving firm) – the z-value is 1.46 and the corresponding p-value is 0.144, (2) (year t-4 versus year t-3) (declining firm versus surviving firm) – the z-value is -0.45 and the corresponding p-value is 0.656, (3) (year t-3 versus year t-2) (declining firm versus surviving firm) – the z-value is 0.3 and the corresponding p-value is 0.761, and (4) (year t-2 versus year t-1) (declining firm versus surviving firm) – the z-value is 1.14 and the corresponding p-value is 0.253. These results indicate that there is no significant effect of the interaction of each calendar year and the firm type (declining or surviving) on the R&D expenditure of firms.

These results are contrary to the evidences of a few prior scholars who found that the decline of firms with respect to time differs in firms (D'Aveni, 1989a) and decline accelerates at a faster pace with the passage of time (Hambrick and D'Aveni, 1988). These findings are also contrary to the findings of prior scholars (Gersick and Hackman, 1990; Kelly and McGrath, 1985; Upton, 1994) who found that organizational routines follow a pace or rhythm as time passes by.

8.12 Conclusion

Declining firms that finally file for bankruptcy are likely to have taken different responses than other firms that do not file for bankruptcy. Among many others, there are two distinct schools of researchers who talk differently about what are the differential responses taken by declining firms relative to the responses taken by surviving firms. The first school of researchers subscribe to the threat rigidity theory (Staw, Sandelands and Dutton, 1981). The second school of researchers subscribe to the behavioral theory of a firm (Cyert and March, 1963). As per this school, firms have goals, aspirations and expectations. The aspirations of firms are based on the firms' historical past performances and the performances of peer firms. When firms have actual performances that are below their aspirations, then decision makers within these firms undertake adaptive change initiatives to reduce the gap between the aspirations and the actual performances. In this study, I compare and contrast the propositions offered by these two schools of researchers in the context of the US Chemical and Allied Products Industry (SIC 2800).

The results indicate support for the threat rigidity perspective (Staw et al., 1981). In each of the two years prior to bankruptcy, declining firms engage in less search (less research as well as less patenting) than their matched surviving counterparts. Therefore, in declining firms in the US Chemical and Allied Products industry, declining firms exhibit threat rigidity when compared with other similar firms that survive. Interestingly, all the firms in the sample dataset of this study belong to mature industries at the four-digit SIC code level. This suggests that among the several definitions of organizational decline that I discussed in Chapter 2, the "decline-as-stagnation" (Whetten, 1980) is the more applicable one in this

context. Declining firms appear passive and show a decrease in the rate of increase of the current activities of the firms.

The results of this study also indicate that there are no changes in search routines in declining firms over the five years immediately preceding bankruptcy. This no change is again evidence of rigidity within the declining firms. Further, this again fits into the definition "decline-as-stagnation". However, it is interesting to note that all the firms in the sample dataset of this study are publicly-listed firms. Therefore, the declining firms in this sample pay heed to shareholders. Institutional shareholders among the many shareholders that these firms have are often found to focus on short-term goals at the cost of long-term goals such as investing in search routines (Wu, 2012). This may be one of the reasons why the declining firms in this sample do not increase their search routine activities.

What is interesting about these findings is the fact that the focal routines that I study here, search routines, are dynamic (Dosi, Teece and Winter, 1992). These routines themselves change often and they also bring change in other operating routines (Nelson and Winter, 1982). However, the results of this study indicate that the search routines of the declining firms do not change over the last five years before bankruptcy. Therefore, the dynamic routines that are supposed to be dynamic are showing indications of being static. Future research can examine when static routines change, and when dynamic routines change. The first question (when static routines change) has been studied by prior researchers. Some researchers found that static routines are stable (Aime, Johnson, Ridge and Hill, 2010). Some other researchers found that static routines change if and when required (Turner and Fern, 2012). Further, some more researchers found that static routines change continuously (Anand, Gray and Siemsen, 2012). However, the second question (when

dynamic routines change) needs to be examined in different contexts. This study's results seem to suggest that dynamic routines tend to remain static in matured industries and also in large, publicly-listed firms.

The results of this study indicate that the search routines of declining firms are smaller than those in surviving firms. However, the search routines of declining firms do not shrink as time progresses towards bankruptcy. This is good news in one sense that decline conditions do not indicate continued deteriorations of search routines within the declining firms. This is again surprising because prior scholars (D'Aveni, 1989a; Hambrick and D'Aveni, 1988; Hambrick and D'Aveni, 1992) have found that declining firms are associated with accelerating deteriorations in many aspects, such as, the top management team, unused borrowing capacity, resource conditions and profitability conditions. However, this study's results do not find any continued deterioration of search routines within declining firms. Also, many organizational routine scholars have found evidence of changes in routines (including search routines) with respect to time pressures (Betsch, Fiedler and Brinkmann, 1998; Lehman, Hahn, Ramanujam and Alge, 2011). However, the time to bankruptcy did not affect the declining firms in this sample dataset in any significant way. This finding suggests that these firms do not sense threat. When rigidity does occur, it might be because the firm lacks resources to correct problems, or the firm management lacks the ability to perceive or correct the problems. These causes, though, are quite different than threat, and deserve further consideration.

The results of this study also indicate that excess resources in the form of organizational slack matters. When declining firms have excess available slack and potential slack, they employ those in order to increase their search routines. This supports the

behavioral theory (Cyert and March, 1963) argument of slack-induced search. Finally, the interaction of potential slack and the time to bankruptcy matters. Potential slack is extra crucial in the fifth year, the fourth year and the third year before bankruptcy. This is likely to indicate that managers within these declining firms use potential slack in these years to immediately enhance search routines. However, when bankruptcy is too near, then the managers stop trying to employ potential slack toward search routines. It is not clear why the firms could not find solutions in the earlier years of the process. The time periods from five to three years before the decline appear to be critically important, and require further direct study.

Overall, this study contributes to the understanding of organizational decline and organizational routines. It contributes to the current literature on organizational decline by suggesting that it is important to examine organizational routines within the context of declining firms. It also suggests that it is difficult to tell a-priori which contexts are going to exhibit rigidity and which contexts are going to exhibit adaptive change. The results of this study seem to hint at the fact that declining firms in a mature industry like the US Chemical and allied products industry are likely to be rigid. The results further suggest that large publicly listed firms are likely to be rigid. Also, this study questions the dominant assumption in the decline literature that decline is associated with deteriorating conditions within the firm. There is a lack of evidence of deterioration of search routines over time in this sample of firms. Finally, the concept that threat becomes larger as time to bankruptcy approaches thereby leading to accelerating deteriorations within declining firms is also to be questioned. This study's results find that the time to bankruptcy does not affect the search routines of declining firms.

This study contributes to the literature on organizational routines by suggesting that dynamic routines that are expected to be changing often can also be unchanging. The search routines examined here do not change within declining firms in the five years immediately preceding bankruptcy. Again, this study seems to question the dominant wisdom in the routines literature that routine shrinkage is a mandatory response to failure (Nelson and Winter, 1982). However, even under conditions of decline, the firms in this sample do not exhibit routine shrinkage.

8.13 The limitations of this study

The main limitation of this study is that the major part of the work is based on publicly available secondary data. Therefore, this study cannot explicitly identify all the probable reasons of the resulting differences in search routines between declining firms and surviving firms. However, it examines the role of organizational slack and time to bankruptcy as probable factors that result in differences in the search routines of the two groups of firms: declining and surviving. Such secondary data examination limits the possibility of rich and fine grained analysis (Becker, Lazaric, Nelson and Winter, 2005). The firms may be changing the direction of their search. For example, instead of focusing on research drug A, a firm may shift its focus to research drug B that caters to a less researched disease. Such fine grained analysis is not present here. In the future, researchers can focus on a finer level of analysis, such as individual therapeutic areas. Future researchers can compare and contrast the differences in search routines of publicly listed firms and private firms to examine whether one set of firms promotes rigidity while another set of firms promotes adaptive change.

A second limitation of this study is that it examines firms in mature industries. Declining firms in younger industries might not exhibit the rigidity that these firms show. In the future, researchers can compare and contrast changes (or no changes) in search routines of declining firms in mature industries and younger industries.

A third limitation of this study is that it examines higher-level search routines (Dosi, Teece and Winter, 1992). Instead of focusing on higher-level routines, future researchers can focus on operating level routines or investment routines (Nelson and Winter, 1982) within declining firms. Further, researchers can empirically examine when do higher-level routines remain dynamic and when they become static. They can ask a similar set of questions for operating routines and investment routines.

A final limitation of this study is that it examines large publicly listed bankrupt firms at the two-digit SIC level of 2800 (the US Chemical and allied products industry). Since there are few bankruptcies of large publicly-listed firms, to get a sufficient number of firms I had to focus at the two-digit SIC level. In the future, researchers can focus on a single industry at the four-digit SIC level by considering declining firms as those firms that have declining profitability for many years, such as three years.

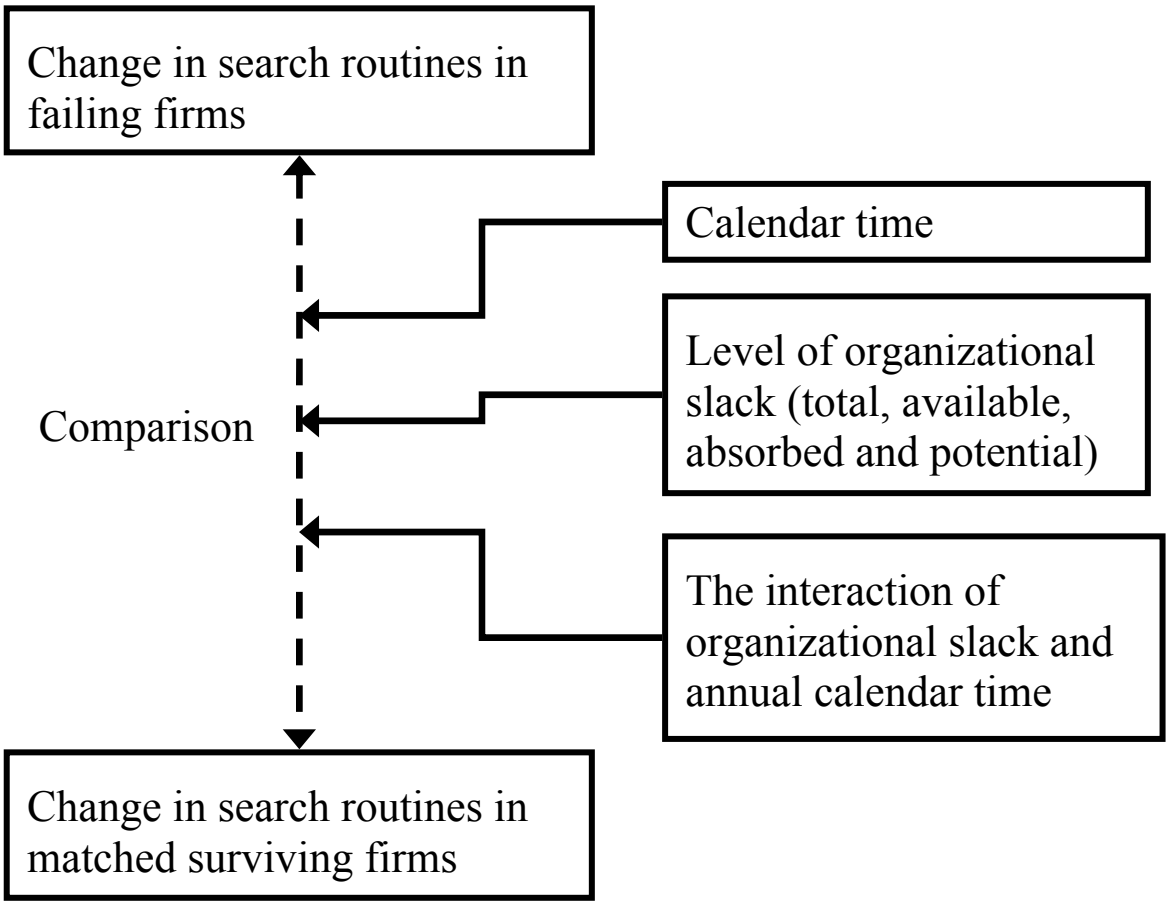

Figure 1.1: A contingency model of search routines in declining firms

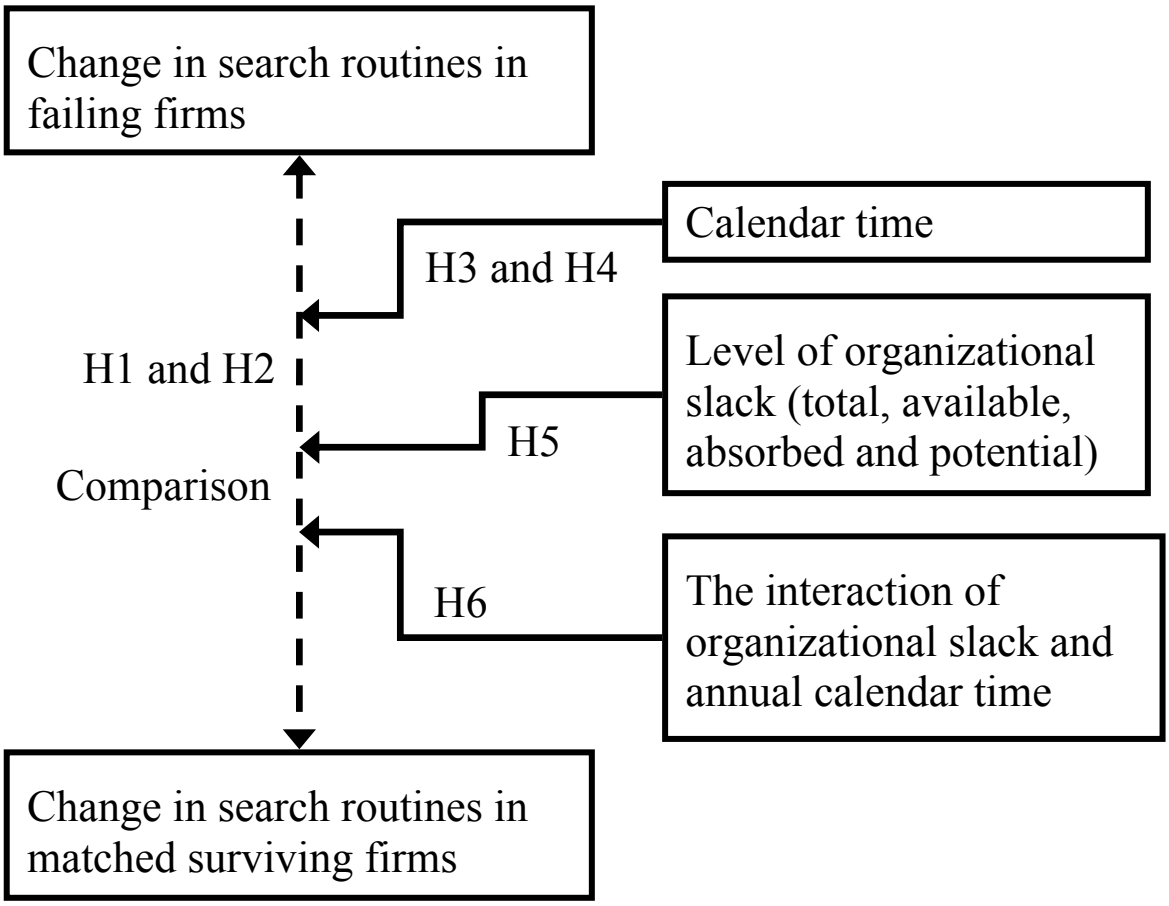

Figure 6.1: Hypotheses in the contingency model of search routines in declining firms

	Adaptive behavior	Threat rigidity responses
Empirical studies on profit-making business organizations	Boeker, 1997 Boeker and Goodstein, 1991 Bowman, 1982 Bromiley, 1991 D'Aveni, 1989b D'Aveni, 1990 Davidson, Worrell and Dutia, 1993 Evans and Green, 2000 Hambrick and D'Aveni, 1988 Ketchen and Palmer, 1999 Khanna and Poulsen, 1995 Miller, 1977 (Failure syndromes: F1 and F4) Miller and Friesen, 1977 (Failure archetypes: F1 and F4) Miller and Friesen, 1983 Morrow, Sirmon, Hitt and Holcomb, 2007 Moulton, Thomas and Pruett, 1996 (Failure type 4: Loss of control pathway) Sheppard, 1994 Singh, 1986 Witteloostuijn, 1998 Willard and Cooper, 1985 Wiseman and Bromiley, 1996	Daily, 1995 Daily and Dalton, 1994b Daily and Dalton, 1995 D'Aunno and Sutton, 1992 D'Aveni, 1989a D'Aveni and MacMillan, 1990 Dowell, Shackell and Stuart, 2011 Hambrick and D'Aveni, 1992 Latham and Braun, 2009 McKinley, 1987 Miller, 1977 (Failure syndromes: F2 and F3) Miller and Friesen, 1977 (Failure archetypes: F2 and F3) Moulton, Thomas and Pruett, 1996 (Failure type 2: Market maladaptation pathway) Nelson, 1981

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	Adaptive behavior	Threat rigidity responses
Theoretical / normative studies	Argenti, 1976 (Failure Type 2 and 3) Cameron and Zammuto, 1983 Castrogiovanni, Baliga and Kidwell, 1992 Cummings, Blumenthal and Greiner, 1983 Makridakis, 1991 Mohrman and Worley, 2009 Meyer, 1988 Nystrom and Starbuck, 1984 Rosenblatt, Rogers and Nord, 1993 Sutton, 1983 Sutton, 1987 Whetten, 1981	Argenti, 1976 (Failure Type 1) Flynn and Farid, 1991 Greenhalgh, 1983 Greenhalgh and Rosenblatt, 1984 Gilmore and Hirschhorn, 1983 Sutton and Callahan, 1987 Sutton and D'Aunno, 1989 Sutton, Eisenhardt and Jucker, 1986
Studies on public organizations / universities	Cyert, 1978 Ford, 1980a Ford, 1980b Koberg, 1987 Manns and March, 1978 Zajac and Kraatz, 1993	Bozeman and Slusher, 1979 Cameron, 1983 Cameron, Kim and Whetten, 1987 Cameron, Whetten and Kim, 1987 Hardy, 1990 Krantz, 1985 Levine, 1978, 1979, 1985 Ludwig, 1993 McKinley, Cheng and Schick, 1986 Rubin, 1979

Table 2.1: Prior studies on adaptive or rigid responses in declining organizations

	Yes / Increase	No / Decrease
Adaptive change	Boeker and Goodstein, 1991 Cummings, Blumenthal and Griener, 1983 Ford, 1980b Ford, 1980a Ketchen and Palmer, 1999 Khanna and Poulsen, 1995 Koberg, 1987 Manns and March, 1978 Sheppard, 1994 Thietart, 1988 Witteloostuijn, 1998 Willard and Cooper, 1985	Cameron, 1983 Cameron, Kim and Whetten, 1987 Cameron, Whetten and Kim, 1987 D'Aveni, 1989a Daily and Dalton, 1994b D'Aunno and Sutton, 1992 Krantz, 1985 Sutton and Callahan, 1987 Sutton and D'Aunno, 1989
Domain initiatives	Boeker, 1997 Cameron and Zammuto, 1983 Hambrick and D'Aveni, 1988 Khanna and Poulsen, 1995 Miller and Friesen, 1983 Zajac and Kraatz, 1993	Bozeman and Slusher, 1979 Hardy, 1990 Levine, 1978, 1979, 1985 McKinley, Cheng and Schick, 1986
Innovation	Bolton, 1993 Evans and Green, 2000 Morrow, Sirmon, Hitt and Holcomb, 2007 Sutton, 1983	Cameron, Kim and Whetten, 1987 Latham and Braun, 2009
Risky initiatives	Bowman, 1982 Bromiley, 1991 D'Aveni, 1989b D'Aveni, 1990 Davidson, Worrell and Dutia, 1993 Miller and Friesen, 1983, Organizational Studies Singh, 1986 Wiseman and Bromiley, 1996	Greenhalgh, 1983 Greenhalgh and Rosenblatt, 1984

Table 2.2: Prior studies regarding change, innovation and risk in declining organizations

The contingent effect of	Authors and year	Relationship
Slack on Change initiatives	Barker and Duhaime, 1997 Cheng and Kesner, 1997 (when the firm allocates more resources toward activities which enhance external market effectiveness) D'Aveni, 1989a Latham and Braun, 2008 (as recession lingered)	+
Slack on Change initiatives	Cheng and Kesner, 1997 (when the firm allocates more resources to activities that enhance internal operational efficiency) Latham and Braun, 2008 (at the beginning of downturn or recession)	-
Slack on Innovation	Cameron, 1983 Mone, McKinley and Barker, 1998	+
Slack on Innovation	Latham and Braun, 2009	-
Slack on Innovation	Geiger and Cashen, 2002 Nohria and Gulati, 1995, 1996	U-inverted
Slack on Risk taking	Audia and Greve, 2006	+
Slack on Risk taking	Bromiley, 1991 (a non-linear relationship but not a full U-shaped because high values of slack have almost no influence on risk)	U
Slack on Risk taking	Martinez and Artz, 2006	U-inverted

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The contingent effect of	Authors and year	Relationship
Available slack on Change initiatives	Cameron, 1983 Iyer and Miller, 2008 Majumdar and Venkataraman, 1993 Voss, Sirdeshmukh and Voss, 2008	+
Available slack on Innovation	Mone, McKinley and Barker, 1998	+
Available slack on Innovation	Geiger and Cashen, 2002	U-inverted
Available slack on Risk taking	Martinez and Artz, 2006 (nearly U-shaped – in a deregulated environment)	U
Available slack on Risk taking	Martinez and Artz, 2006 (in a regulated environment) Singh, 1986 Wiseman and Bromiley, 1996	0
Recoverable slack on Change initiatives	Miller, Lant, Milliken and Korn, 1996	+
Recoverable slack on Innovation	Greve, 2003	+
Recoverable slack on Innovation	Geiger and Cashen, 2002	U-inverted
Recoverable slack on Risk taking	Singh, 1986	+
Recoverable slack on Risk taking	Wiseman and Bromiley, 1996	-

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The contingent effect of	Authors and year	Relationship
Recoverable slack on Risk taking	Wiseman and Catanach, 1997	U-inverted
Potential slack on Change initiatives	Bergh and Lawless, 1998 Iyer and Miller, 2008	+
Potential slack on Innovation	Geiger and Cashen, 2002	+
Potential slack on Risk taking	Martinez and Artz, 2006 (in a deregulated environment) Wiseman and Bromiley, 1996 Wiseman and Catanach, 1997	+
Potential slack on Risk taking	Martinez and Artz, 2006 (in a regulated environment)	U

Table 3.1: Prior studies on the effect of slack

	Time-dependent empirical models	Time as a contingency variable
Patterns of decline		D'Aveni, 1989a
Change initiatives	Khanna and Poulsen, 1995 Masuch, 1985 Musso and Schiavo, 2008 Zajac and Kraatz, 1993	Musso and Schiavo, 2008
Domain initiatives		Hambrick and D'Aveni, 1988
Risk taking	Bromiley, 1991	
Innovation	Hundley, Jacobson and Park, 1996	

Table 3.2: Prior studies on the role of time in declining organizations

Author, year	Class of variables	Type of paired comparison
Khanna and Poulsen, 1995	Stock market reactions[1]	Bankrupts and non-bankrupts
Khanna and Poulsen, 1995 Moulton, Thomas and Pruett, 1996	Financial variables	Bankrupts and non-bankrupts
Bruton, Ahlstrom and Wan, 2003 O'Neill, 1986b Poston, Harmon and Gramlich, 1994 Ramanujam, 1984 Smith and Graves, 2005	Financial variables[2]	Non-turnarounds and turnarounds
Kaplan and Zingales, 1997	Financial variables	Financially constrained and financially unconstrained
Hambrick and D'Aveni, 1988 Khanna and Poulsen, 1995 Sheppard, 1994	Strategic changes[3]	Bankrupts and non-bankrupts
Pant, 1986 Poston, Harmon and Gramlich, 1994 Ramanujam, 1984	Strategic changes	Non-turnarounds and turnarounds
Woo, 1983	Strategic changes	Poor performing and well performing

Table 4.1: Prior matched pair comparison studies on similarities between different firm types

[1] Examples are reactions to debt swaps and top management changes.

[2] Examples are cash as a proportion of total assets and available slack.

[3] Examples are change in domain initiatives and level of diversification.

		Mean	Std. dev.	1	2	3	4	5	6	7	8	9	10
1	**Logged value of R&D expenditure**	15.68	2.12	1.00									
2	**Count of patents**	2.48	6.03	0.51	1.00								
3	**Total slack**	21.60	181.20	0.02	0.05	1.00							
4	**Logged value of total slack**	2.35	1.67	0.20	0.26	0.38	1.00						
5	**Available slack**	1.43	2.51	0.02	0.01	-0.02	0.09	1.00					
6	**Logged value of available slack**	-1.14	2.16	0.18	0.04	-0.03	0.03	0.65	1.00				
7	**Recoverable slack**	18.62	171.97	-0.01	-0.04	0.97	0.31	-0.02	-0.04	1.00			
8	**Logged value of recoverable slack**	0.17	1.99	-0.18	-0.17	0.30	0.21	0.15	0.03	0.32	1.00		
9	**Potential slack**	0.75	47.18	0.13	0.33	0.25	0.38	-0.07	-0.01	-0.01	-0.09	1.00	
10	**Logged value of potential slack**	3.07	1.01	0.12	0.32	0.59	0.81	0.08	0.15	-0.09	-0.05	0.61	1.00

Table 8.1: Descriptive statistics of the variables of interest

Variable: R&D expenditure in US dollars	t-5			t-4			t-3			t-2			t-1		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	34	13600000	18400000	36	12700000	16800000	35	12900000	17500000	31	12300000	18000000	24	14800000	21100000
		(3156815)			(2792273)			(2958043)			(3232361)			(4304809)	
Survivor	35	111000000	361000000	35	117000000	385000000	35	115000000	363000000	35	115000000	346000000	35	120000000	360000000
		(61100000)			(65000000)			(61400000)			(58400000)			(60800000)	
Combined	69	62800000	260000000	71	64300000	274000000	70	63900000	260000000	66	66500000	256000000	59	77500000	281000000
		(31300000)			(32500000)			(31100000)			(31500000)			(36500000)	
Difference		-96900000			-105000000			-102000000			-102000000			-106000000	
		(61100000)			(65100000)			(61500000)			(58500000)			(60900000)	
t-value		-1.58			-1.61			-1.66			-1.75			-1.73	
Satterthwaite's degrees of freedom		34			34			34			34			34	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.06	ǂ		0.06	ǂ		0.05	ǂ		0.04	**		0.05	**
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.12			0.12			0.11			0.09	ǂ		0.09	ǂ
p-value for Ha: mean(bankrupt) > mean(survivor)		0.94			0.94			0.95			0.96			0.95	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1
** p-value < 0.05
*** p-value < 0.001

Table 8.2: Tests of Hypotheses 1a and 2a – t-tests

Variable: Patent count	**t-5**			**t-4**			**t-3**			**t-2**			**t-1**		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	36	1.75	4.08	36	2.31	4.60	36	1.64	4.17	36	0.83	2.70	36	1.17	3.68
		(0.68)			(0.77)			(0.69)			(0.45)			(0.61)	
Survivor	36	3.28	7.06	36	3.22	7.62	36	3.86	9.36	36	3.28	6.65	36	3.44	6.78
		(1.18)			(1.27)			(1.56)			(1.11)			(1.13)	
Combined	72	2.51	5.78	72	2.76	6.26	72	2.75	7.28	72	2.06	5.19	72	2.31	5.54
		(0.68)			(0.74)			(0.86)			(0.61)			(0.65)	
Difference		-1.53			-0.92			-2.22			-2.44			-2.28	
		(1.36)			(1.48)			(1.71)			(1.20)			(1.29)	
t-value		-1.12			-0.62			-1.30			-2.04			-1.77	
Satterthwaite's degrees of freedom		56			58			48			46			54	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.13			0.27			0.10	ǂ		0.02	**		0.04	**
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.27			0.54			0.20			0.05	**		0.08	ǂ
p-value for Ha: mean(bankrupt) > mean(survivor)		0.87			0.73			0.90			0.98			0.96	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1

** p-value < 0.05

*** p-value < 0.001

Table 8.3: Tests of Hypotheses 1b and 2b – t-tests

Variable: R&D expenditure in US dollars	**t-4 to t-5**			**t-3 to t-4**			**t-2 to t-3**			**t-1 to t-2**		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Group 1 (succeeding year i.e. in the case of t-4 to t-5 comparison, Group 1 is t-4)	36	12700000	16800000	35	12900000	17500000	31	12300000	18000000	24	14800000	21100000
		(2792273)			(2958043)			(3232361)			(4304809)	
Group 2 (preceding year i.e. in the case of t-4 to t-5 comparison, Group 2 is t-5)	34	13600000	18400000	36	12700000	16800000	35	12900000	17500000	31	12300000	18000000
		(3156815)			(2792273)			(2958043)			(3232361)	
Combined	70	13100000	17500000	71	12800000	17000000	66	12600000	17600000	55	13400000	19300000
		(2086188)			(2017878)			(2166444)			(2597210)	
Difference		-950801.70			173391.30			-590022.20			2550897	
		(4214530)			(4067776)			(4381573)			(5383265)	
t-value		-0.23			0.04			-0.13			0.47	
Satterthwaite's degrees of freedom		66.47			68.64			62.57			45.22	
p-value for Ha: mean(Group 1) < mean(Group 2)		0.41			0.52			0.45			0.68	
p-value for Ha: mean(Group 1)!= mean(Group 2)		0.82			0.97			0.89			0.64	
p-value for Ha: mean(Group 1) > mean(Group 2)		0.59			0.48			0.55			0.32	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1
** p-value < 0.05
*** p-value < 0.001

Table 8.4: Tests of Hypotheses 3a and 4a – t-tests

Variable: Patent count	t-4 to t-5			t-3 to t-4			t-2 to t-3			t-1 to t-2		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Group 1 (succeeding year i.e. in the case of t-4 to t-5 comparison, Group 1 is t-4)	36	2.31	4.60	36	1.64	4.17	36	0.83	2.70	36	1.17	3.68
		(0.77)			(0.69)			(0.45)			(0.61)	
Group 2 (preceding year i.e. in the case of t-4 to t-5 comparison, Group 2 is t-5)	36	1.75	4.08	36	2.31	4.60	36	1.64	4.17	36	0.83	2.70
		(0.68)			(0.77)			(0.69)			(0.45)	
Combined	72	2.03	4.32	72	1.97	4.37	72	1.24	3.51	72	1.00	3.21
		(0.51)			(0.52)			(0.41)			(0.38)	
Difference		0.56			-0.67			-0.81			0.33	
		(1.02)			(1.03)			(0.83)			(0.76)	
t-value		0.54			-0.64			-0.97			0.44	
Satterthwaite's degrees of freedom		69.03			69.34			59.96			64.17	
p-value for Ha: mean(Group 1) < mean(Group 2)		0.71			0.26			0.17			0.67	
p-value for Ha: mean(Group 1)!= mean(Group 2)		0.59			0.52			0.33			0.66	
p-value for Ha: mean(Group 1) > mean(Group 2)		0.29			0.74			0.83			0.33	

Standard errors are within parentheses just below each mean

ŧ p-value < 0.1

** p-value < 0.05

*** p-value < 0.001

Table 8.5: Tests of Hypotheses 3b and 4b – t-tests

Variable name	Model 1	Model 2	Model 3	Model 4
Dummy for year t-2	-0.017	-0.184	-0.114	-0.093
	(0.102)	(0.154)	(0.141)	(0.091)
Dummy for year t-3	0.070	-0.014	0.051	-0.142
	(0.133)	(0.101)	(0.089)	(0.140)
Dummy for year t-4	0.061	-0.155	-0.026	-0.279
	(0.167)	(0.152)	(0.124)	(0.182)
Dummy for year t-5	0.132	-0.241 ǂ	-0.113	-0.300 ǂ
	(0.157)	(0.138)	(0.126)	(0.160)
Decade of 2000s	-0.239	-0.296	-0.288	-0.175
	(0.209)	(0.213)	(0.219)	(0.109)
Decade of 2010s	-0.552 *	-1.005 **	-0.851 **	-0.534 *
	(0.266)	(0.316)	(0.290)	(0.187)
Survival indicator	0.986 *	0.871 *	1.038 *	1.340
	(0.482)	(0.416)	(0.415)	(0.838)
Logged value of total slack	0.034			
	(0.035)			
Logged value of available slack		0.111 **		
		(0.040)		
Logged value of recoverable slack			0.041	
			(0.039)	
Logged value of potential slack				0.102 ǂ
				(0.060)
Constant	15.171	15.662 **	15.341	15.393
	(0.399)	(0.423)	(0.397)	(0.679)

ǂ Significant at the 10% level
* Significant at the 5% level
** Significant at the 1% level
Robust standard errors are in parentheses

Table 8.6: Tests of Hypothesis 5a – panel regressions with dependent variable: log R&D

Variable name	Model 5	Model 6	Model 7	Model 8
Dummy for year t-2	-0.402 ǂ	-0.232	-0.277	-0.386
	(0.232)	(0.181)	(0.183)	(0.247)
Dummy for year t-3	-0.142	0.046	0.035	-0.324
	(0.215)	(0.171)	(0.172)	(0.252)
Dummy for year t-4	-0.049	-0.038	0.041	-0.143
	(0.230)	(0.193)	(0.189)	(0.266)
Dummy for year t-5	0.031	-0.171	-0.084	-0.143
	(0.249)	(0.208)	(0.203)	(0.298)
Decade of 2000s	0.091	-0.118	-0.153	0.037
	(0.258)	(0.193)	(0.194)	(0.282)
Decade of 2010s	-0.797	-1.450	-1.401	-0.332
	(1.132)	(1.078)	(1.076)	(1.197)
Survival indicator	1.080 *	0.471	0.625	0.073
	(0.533)	(0.487)	(0.455)	(0.800)
Logged value of total slack	0.157 *			
	(0.073)			
Logged value of available slack		0.154 *		
		(0.063)		
Logged value of recoverable slack			-0.096	
			(0.066)	
Logged value of potential slack				0.282 *
				(0.119)
Constant	0.879	1.913 **	1.571 **	1.760 ǂ
	(0.645)	(0.513)	(0.470)	(0.979)
AIC	651.220	956.628	965.649	391.520
BIC	688.348	998.583	1007.768	419.140

ǂ Significant at the 10% level
* Significant at the 5% level
** Significant at the 1% level
Standard errors are in parentheses

Table 8.7: Tests of Hypothesis 5b – panel negative binomial regressions with dependent variable: patent count.

Variable name	Model 9	Model 10	Model 11	Model 12
Dummy for year t-2	-0.145	-0.099	-0.117	0.230
	(0.268)	(0.111)	(0.146)	(0.465)
Dummy for year t-3	0.105	-0.028	0.056	0.964
	(0.256)	(0.102)	(0.093)	(0.694)
Dummy for year t-4	0.580 *	-0.181	-0.038	1.154
	(0.266)	(0.149)	(0.128)	(0.737)
Dummy for year t-5	0.418	-0.263 †	-0.138	0.956
	(0.349)	(0.150)	(0.133)	(0.679)
Decade of 2000s	-0.286	-0.319	-0.306	-0.238 *
	(0.201)	(0.219)	(0.229)	(0.102)
Decade of 2010s	-0.652 **	-1.034 **	-0.859 **	-0.494 **
	(0.237)	(0.321)	(0.303)	(0.185)
Survival indicator	0.963 *	0.865 *	1.022 *	1.190
	(0.484)	(0.418)	(0.413)	(0.913)
Logged value of total slack	0.087			
	(0.087)			
Logged value of total slack* Dummy for year t-2	0.060			
	(0.095)			
Logged value of total slack* Dummy for year t-3	-0.020			
	(0.089)			
Logged value of total slack* Dummy for year t-4	-0.213 *			
	(0.090)			
Logged value of total slack* Dummy for year t-5	-0.120			
	(0.116)			
Logged value of available slack		0.110 *		
		(0.055)		
Logged value of available slack* Dummy for year t-2		0.068		
		(0.065)		
Logged value of available slack* Dummy for year t-3		-0.007		
		(0.045)		
Logged value of available slack* Dummy for year t-4		-0.024		
		(0.052)		

Table continued on next page..

Variable name	Model 9	Model 10	Model 11	Model 12
Logged value of available slack* Dummy for year t-5		-0.018		
		(0.050)		
Logged value of recoverable slack			0.019	
			(0.058)	
Logged value of recoverable slack* Dummy for year t-2			-0.073	
			(0.084)	
Logged value of recoverable slack* Dummy for year t-3			-0.008	
			(0.045)	
Logged value of recoverable slack* Dummy for year t-4			0.025	
			(0.052)	
Logged value of recoverable slack* Dummy for year t-5			0.075	
			(0.051)	
Logged value of potential slack				0.429 *
				(0.206)
Logged value of potential slack* Dummy for year t-2				-0.111
				(0.166)
Logged value of potential slack* Dummy for year t-3				-0.362 ǂ
				(0.216)
Logged value of potential slack* Dummy for year t-4				-0.470 *
				(0.240)
Logged value of potential slack* Dummy for year t-5				-0.423 ǂ
				(0.222)
Constant	15.115 **	15.690 **	15.371 **	14.624 **
	(0.44)	(0.44)	(0.41)	(0.71)

ǂ Significant at the 10% level
* Significant at the 5% level
** Significant at the 1% level
Robust standard errors are in parentheses

Table 8.8: Tests of Hypotheses 6a and 6b – panel regressions with dependent variable: log R&D

Variable name	Model 13	Model 14	Model 15	Model 16
Dummy for year t-2	-0.847	-0.235	-0.163	-0.195
	(0.748)	(0.197)	(0.207)	(1.262)
Dummy for year t-3	-0.166	0.027	0.118	1.163
	(0.538)	(0.188)	(0.195)	(0.982)
Dummy for year t-4	-0.248	-0.074	0.144	1.191
	(0.627)	(0.205)	(0.211)	(1.101)
Dummy for year t-5	1.222 *	-0.217	0.016	2.536 *
	(0.591)	(0.219)	(0.224)	(1.273)
Decade of 2000s	-0.057	-0.137	-0.160	-0.226
	(0.273)	(0.198)	(0.199)	(0.293)
Decade of 2010s	-1.083	-1.502	-1.354	-0.431
	(1.139)	(1.083)	(1.080)	(1.220)
Survival indicator	1.049 *	0.518	0.572	-0.116
	(0.529)	(0.503)	(0.457)	(0.842)
Logged value of total slack	0.249			
	(0.157)			
Logged value of total slack* Dummy for year t-2	0.142			
	(0.237)			
Logged value of total slack* Dummy for year t-3	-0.180			
	(0.162)			
Logged value of total slack* Dummy for year t-4	0.037			
	(0.203)			
Logged value of total slack* Dummy for year t-5	-0.419 *			
	(0.197)			
Logged value of available slack		0.186 †		
		(0.096)		
Logged value of available slack* Dummy for year t-2		-0.115		
		(0.110)		
Logged value of available slack* Dummy for year t-3		-0.020		
		(0.097)		
Logged value of available slack* Dummy for year t-4		-0.024		
		(0.096)		
Logged value of available slack* Dummy for year t-5		-0.086		
		(0.096)		

Table continued on next page..

Variable name	Model 13	Model 14	Model 15	Model 16
Logged value of recoverable slack			-0.213 ǂ	
			(0.111)	
Logged value of recoverable slack* Dummy for year t-2			0.155	
			(0.124)	
Logged value of recoverable slack* Dummy for year t-3			0.081	
			(0.113)	
Logged value of recoverable slack* Dummy for year t-4			0.157	
			(0.112)	
Logged value of recoverable slack* Dummy for year t-5			0.142	
			(0.112)	
Logged value of potential slack				0.759 *
				(0.319)
Logged value of potential slack* Dummy for year t-2				-0.058
				(0.381)
Logged value of potential slack* Dummy for year t-3				-0.463
				(0.296)
Logged value of potential slack* Dummy for year t-4				-0.449
				(0.346)
Logged value of potential slack* Dummy for year t-5				-0.861 *
				(0.402)
Constant	0.916	1.980 **	1.511 **	1.106
	0.811	0.535	0.477	1.573
AIC	647.956	963.470	970.801	393.539
BIC	698.585	1020.682	1028.235	431.202

ǂ Significant at the 10% level

* Significant at the 5% level

** Significant at the 1% level

Standard errors are in parentheses

Table 8.9: Tests of Hypotheses 6a and 6b – panel negative binomial regressions with dependent variable: patent count

Hypothesis	Statement of the hypothesis	Results	Comments
1a	The research and development (R&D) expenditure of declining firms will be less than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.	Supported.	
1b	The patent count of declining firms will be less than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.	Partially supported.	Supported for years t-2 and t-1 where t0 is the year of bankruptcy filing.
2a	The research and development (R&D) expenditure of declining firms will be more than the research and development expenditure of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.	Not supported.	
2b	The patent count of declining firms will be more than the patent counts of surviving firms in each of the five years immediately preceding bankruptcy of declining firms.	Not supported.	
3a	The R&D expenditure of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing.	Not supported.	
3b	The patent count of declining firms will decrease from each year to the next in the last five years prior to bankruptcy filing.	Not supported.	
4a	The R&D expenditure of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.	Not supported.	
4b	The patent count of declining firms will increase from each year to the next in the last five years prior to bankruptcy filing.	Not supported.	
5a	The R&D expenditure of all firms will have a logarithmic relationship with organizational slack (total slack, available slack, recoverable slack and potential slack)	Partially supported.	Supported for available slack and potential slack. Not supported for recoverable slack and total slack
5b	The patent count of all firms will have a logarithmic relationship with organizational slack (total slack, available slack, recoverable slack and potential slack)	Partially supported.	Supported for available slack, potential slack and total slack. Not supported for recoverable slack
6a	The R&D expenditure and patent counts of firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the R&D expenditure and patent counts of declining firms will be lower than those of surviving firms.	Partially supported.	Supported for R&D expenditure and total slack for year t-4. Partially supported for R&D expenditure and potential slack for years t-5, t-4 and t-3 where t0 is the year of bankruptcy filing. Supported for patent count and total slack for year t-5. Partially supported for patent count and potential slack for year t-5.
6b	The R&D expenditure and patent count of all firms will be a function of the interaction of the amount of organizational slack of the firms and the annual calendar time. Even after controlling for these interaction effects, the R&D expenditure and patent count of declining firms will be higher than those of surviving firms.	Not supported.	

Table 8.10: Hypotheses and their results

Variable: Total slack	t-5			t-4			t-3			t-2			t-1		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	32	30.21	95.15	34	6.69	28.31	36	-1.50	73.79	31	1.36	-2.79	22	20.88	96.07
		(16.82)			(4.85)			(12.30)			(11.32)			(20.48)	
Survivor	34	99.48	530.04	33	16.99	26.02	35	27.54	87.14	35	3.49	-14.73	34	10.95	43.83
		(90.90)			(4.53)			(14.73)			(53.06)			(7.52)	
Combined	66	65.89	384.93	67	11.76	27.49	71	12.82	81.39	66	2.49	-7.14	56	14.85	68.56
		(47.38)			(3.36)			(9.66)			(39.15)			(9.16)	
Difference		-69.28			-10.29			-29.04			-2.13			9.93	
		(92.44)			(6.64)			(19.19)			(9.20)			(21.82)	
t-value		-0.75			-1.55			-1.51			-0.23			0.46	
Satterthwaite's degrees of freedom		35			65			67			37			27	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.23			0.06	ǂ		0.07	ǂ		0.41			0.67	
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.46			0.13			0.13			0.82			0.65	
p-value for Ha: mean(bankrupt) > mean(survivor)		0.77			0.94			0.93			0.59			0.33	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1
** p-value < 0.05
*** p-value < 0.001

Table 8.11: Exploratory analyses – t-tests of total slack

Variable: Available slack	t-5			t-4			t-3			t-2			t-1		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	36	1.61	2.44	36	1.45	2.74	36	1.08	1.94	31	0.71	1.27	23	0.33	0.56
		(0.41)			(0.46)			(0.32)			(0.23)			(0.12)	
Survivor	35	2.19	1.09	34	2.82	4.24	35	1.30	2.30	35	1.05	1.59	35	1.32	1.62
		(0.54)			(0.73)			(0.39)			(0.27)			(0.27)	
Combined	71	1.90	1.22	70	2.11	3.59	71	1.18	2.12	66	0.89	1.45	58	0.93	1.39
		(0.34)			(0.43)			(0.25)			(0.18)			(0.18)	
Difference		-0.58			-1.38			-0.22			-0.34			-0.99	
		(0.68)			(0.86)			(0.51)			(0.35)			(0.30)	
t-value		-0.86			-1.60			-0.44			-0.96			-3.33	
Satterthwaite's degrees of freedom		63.47			55.93			66.44			63.28			45.13	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.20			0.06	ǂ		0.33			0.17			0.00	***
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.39			0.11			0.66			0.34			0.00	***
p-value for Ha: mean(bankrupt) > mean(survivor)		0.80			0.94			0.67			0.83			1.00	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1

** p-value < 0.05

*** p-value < 0.001

Table 8.12: Exploratory analyses – t-tests of available slack

Variable: Recoverable slack	t-5			t-4			t-3			t-2			t-1		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	36	26.26	89.18	36	7.85	17.20	36	10.36	19.84	32	3.81	5.22	24	21.95	90.94
		(14.86)			(2.87)			(3.31)			(0.92)			(18.56)	
Survivor	36	90.86	514.41	36	3.69	7.68	35	6.62	21.42	35	5.72	16.05	34	7.24	22.90
		(85.73)			(1.28)			(3.62)			(2.71)			(3.93)	
Combined	72	58.56	368.00	72	5.77	13.39	71	8.52	20.57	67	4.81	12.10	58	13.33	60.78
		(43.37)			(1.58)			(2.44)			(1.48)			(7.98)	
Difference		-64.60			4.16			3.74			-1.91			14.70	
		(87.01)			(3.14)			(4.90)			(2.87)			(18.97)	
t-value		-0.74			1.32			0.76			-0.67			0.77	
Satterthwaite's degrees of freedom		37.10			48.41			68.25			41.71			25.07	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.23			0.90			0.78			0.25			0.78	
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.46			0.19			0.45			0.51			0.45	
p-value for Ha: mean(bankrupt) > mean(survivor)		0.77			0.10	ǂ		0.22			0.75			0.22	

Standard errors are within parentheses just below each mean

ǂ p-value < 0.1
** p-value < 0.05
*** p-value < 0.001

Table 8.13: Exploratory analyses – t-tests of recoverable slack

Variable: Potential slack	t-5			t-4			t-3			t-2			t-1		
Group	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**	**Obs**	**Mean**	**Std. Dev.**
Bankrupt	32	-0.85	19.73	34	-3.08	20.03	36	-12.94	69.45	32	-3.19	9.44	23	-3.21	9.44
		(3.49)			(3.44)			(11.57)			(1.67)			(1.97)	
Survivor	35	0.97	53.79	35	9.70	27.06	35	19.63	86.28	35	-3.28	50.36	35	2.24	38.79
		(9.09)			(4.57)			(14.58)			(8.51)			(6.56)	
Combined	67	0.10	40.92	69	3.40	24.54	71	3.12	79.35	67	-3.23	36.72	58	0.08	30.64
		(5.00)			(2.95)			(9.42)			(4.49)			(4.02)	
Difference		-1.82			-12.78			-32.56			0.09			-5.45	
		(9.74)			(5.72)			(18.62)			(8.67)			(6.85)	
t-value		-0.19			-2.23			-1.75			0.01			-0.80	
Satterthwaite's degrees of freedom		43.70			62.64			65.19			36.61			39.90	
p-value for Ha: mean(bankrupt) < mean(survivor)		0.43			0.01	**		0.04	**		0.50			0.22	
p-value for Ha: mean(bankrupt)!= mean(survivor)		0.85			0.03	**		0.09	ŧ		0.99			0.43	
p-value for Ha: mean(bankrupt) > mean(survivor)		0.57			0.99			0.96			0.50			0.78	

Standard errors are within parentheses just below each mean

ŧ p-value < 0.1
** p-value < 0.05
*** p-value < 0.001

Table 8.14: Exploratory analyses – t-tests of potential slack

APPENDIX 1

Algorithm of ranking suitable matched surviving firms

1. For each Excel worksheet corresponding to a bankrupt firm, run the same program.

2. Declare variables.

3. Read and store the required variables from the first row and separately store them in an array. The first row stores variable values of the bankrupt firm. The other rows include variable values from a possible group of matched surviving firms.

4. Matching criterion 1 (Primary SIC code): Read values of Primary SIC code from Column K (for all rows except row 1).

    a. Check if the values of matching criterion for all rows are the same. If not, then eliminate the row (i.e. note the row number) that does not have the same value.

5. Matching criterion 2a (Secondary SIC code): Read values of Secondary SIC code from Column AE (for all rows except row 1).

    a. Compare (i.e. simply subtract) each of the values of Secondary SIC code from the same value in row 1.

    b. Sort the absolute values (i.e. absolute differences) in ascending order in an array.

    c. Rank the absolute values (i.e. absolute differences) in the array in ascending order from 1, 2, …..to n.

    d. Store the ranks for each row.

6. Matching criterion 2b (Additional SIC code): Read values of Additional SIC code from Column AK (for all rows except row 1).

    a. Compare (i.e. simply subtract) each of the values of Additional SIC code from the same value in row 1.

    b. Sort the absolute values (i.e. absolute differences) in ascending order in an array.

    c. Rank the absolute values (i.e. absolute differences) in the array in ascending order from 1, 2, …..to n.

    d. Store the ranks for each row.

7. Matching criterion 2c (Product-market presence): This criterion is a combination of matching criteria 1, 2a and 2b where the primary SIC code, the secondary SIC code and the additional SIC codes are matched.

8. Matching criterion 3 (Sales): Read values of sales from column AA (for all rows except row 1).

    a. Compare (i.e. simply subtract) each of the values of Sales from the same value in row 1.

    b. Sort the absolute values (i.e. absolute differences) in ascending order in an array.

    c. Rank the absolute values (i.e. absolute differences) in the array in ascending order from 1, 2, …..to n.

    d. Store the ranks for each row.

9. Matching criterion 4 (Total number of employees): Read values of Total number of employees from column S (for all rows except row 1).

    a. Compare (i.e. simply subtract) each of the values of Total number of employees from the same value in row 1.

    b. Sort the absolute values (i.e. absolute differences) in ascending order in an array.

    c. Rank the absolute values (i.e. absolute differences) in the array in ascending order from 1, 2, …..to n.

    d. Store the ranks for each row.

10. Matching criterion 5 (Information available in COMPUSTAT - Historical Segments thru WRDS): Read values from column AQ.

    a. Rank the row = 10 if value= “no”.

    b. Rank the row = 5 if value = “partial”.

    c. Rank the row = 1 if value = “yes”.

11. Matching criterion 6 (Information available in COMPUSTAT - Fundamentals annual Updates thru WRDS): Read values from column AR.

    a. Rank the row = 10 if value= “no”.

    b. Rank the row = 5 if value = “partial”.

    c. Rank the row = 1 if value = “yes”.

12. Matching criterion 7 (Information available in COMPUSTAT North America - Monthly Updates - Simplified Financial Statement Extract thru WRDS): Read values from column AS.

    a. Rank the row = 10 if value= “no”.

    b. Rank the row = 5 if value = “partial”.

    c. Rank the row = 1 if value = “yes”.

13. Matching criterion 8 (Status of stock): Read values from column F.

    a. Rank the row = 10 if value= “delisted”.

    b. Rank the row = 5 if value = “active till …”.

    c. Rank the row = 1 if value = “active”.

14. Now, add the ranks stored for each row.

15. Then, sort the summed-up ranking in ascending order. The best match is the one with the best rank.

16. For each of the variables, first check for the presence of data. Only when data is present, then carry out the logical program.

17. Also, for each of the values read, print it out in order to check it.

18. Also for each solution arrived, print it out in order to check it.

APPENDIX 2

Details about the bankrupt firms in the dataset:

Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
1	DelSite, Inc.	2-April-2009	DelSite, Inc. is an ISO 9001-certified, research-based, biopharmaceutical and consumer products company with a core technology based on naturally-occurring complex carbohydrates.
2	Oscient Pharmaceuticals Corp.	13-Jul-2009	Oscient Pharmaceuticals was formed by the merger of Genome Therapeutics Corp. and privately held Genesoft Pharmaceuticals in February, 2004. Oscient is a commercial-stage biopharmaceutical company.
3	ReGen Biologics, Inc.	8-April-2011	ReGen Biologics, Inc. is an orthopedic products company that develops, manufactures and markets innovative tissue growth and repair products for U.S. and global markets.
4	Chemtura Corp.	18-Mar-2009	Chemtura Corp. develops, manufactures and markets application-focused specialty chemical solutions and consumer products.
5	Solutia Inc.	17-Dec-2003	Solutia is a market-leading performance materials and specialty chemicals company. The company focuses on providing solutions for a range of products, such as: interlayers for glass lamination and films for automotive and architectural applications.

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Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
6	GeoPharma, Inc.	23-Mar-2011	GeoPharma, Inc. is a rapidly growing Bio/Pharma company with a diversified business model participating in 3 main market segments: Specialty Pharma, Manufacturing and Distribution. The Specialty Pharma division specializes in the formulation of generic drugs for human and veterinary usage and the development of medical devices used by oncologists and other medical professionals.
7	Biopure Corporation	16-Jul-2009	Biopure is the developer of the first FDA-approved "blood substitute" for veterinary use. Biopure Corporation is a privately held, biopharmaceutical company focusing on the identification, ultrapurification, manufacture and marketing of room-temperature-stable therapeutic proteins for veterinary and human use.
8	Gliatech Inc.	9-May-2002	Gliatech Inc. is engaged in the discovery and development of biosurgery and pharmaceutical products. Gliatech's pharmaceutical product candidates include small molecule drugs to modulate the cognitive state of the nervous system and proprietary monoclonal antibodies designed to inhibit inflammation.
9	MiddleBrook Pharmaceuticals, Inc.	30-Apr-2010	MiddleBrook Pharmaceuticals, Inc. is a pharmaceutical company focused on developing and commercializing anti-infective products
10	Shaman Pharmaceuticals Inc.	5-Jan-2001	Shaman Pharmaceuticals, Inc. discovers and develops novel pharmaceutical products for major human diseases by isolating active compounds from tropical plants with a history of medicinal use.

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Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
11	TL Administration Corp.	4-Sep-2003	This company manufactures brand name nutritional supplements. These products are sold through health and natural food stores, national and regional drug store chains, supermarkets and mass merchandise retailers.
12	Advanced Tissue Sciences, Inc.	10-Oct-2002	Advanced Tissue Sciences is a tissue engineering company utilizing its proprietary core technology to develop and manufacture human-based tissue products for tissue repair and transplantation.
13	Naturade Inc.	31-Aug-2006	Naturade manufactures innovative natural products for the well being of people. It makes its products widely available through mass merchandiser and club stores, drug and food stores, health food stores and natural supermarkets.
14	Nutrition 21 Inc.	26-Aug-2011	This is a nutritional bioscience company. The company primarily develops and markets raw materials, formulations, compounds, blends and bulk and other materials to third-party, non-end users to be further fabricated, blended or packaged for sales to end-users as nutritional supplements.
15	North American Scientific Inc.	11-Mar-2009	North American Scientific, Inc. manufactures, markets and sells products for the treatment of radiation therapy for diseases such as prostrate cancer.
16	NutraCea	30-Apr-2010	NutraCea is a world leader in production and marketing of stabilized rice bran, rice bran oil and their derivative products.

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Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
17	Vaso Active Pharmaceuticals Inc.	11-Mar-2010	Vaso Active is an early stage company focused on commercializing, marketing and selling over-the-counter pharmaceutical products.
18	Zaxis International Inc.	6-Nov-2002	Zaxis International Inc. is a biotechnology company that produces electrophoresis gels for testing blood proteins and various genetic compounds.
19	Aventine Renewable Energy Holdings, Inc.	7-Apr-2009	Aventine Renewable Energy Holdings Inc. is a leading producer of clean renewable energy. Aventine is a leading producer of ethanol.
20	Introgen Therapeutics, Inc.	3-Dec-2008	Introgen Therapeutics, Inc. is a biopharmaceutical company focused on the discovery, development and commercialization of targeted molecular therapies for the treatment of cancer and other diseases.
21	HealthSport, Inc.	23-Sep-2011	HealthSport is a company specializing in the development and manufacture of proprietary, oral thin film products. These products are for the pharmaceutical, nutraceutical and veterinary markets.
22	Large Scale Biology Corp.	9-Jan-2006	Large Scale Biology Corp uses its proprietary gene expression, molecular engineering and bioprocessing technologies to develop and manufacture therapeutic and industrial proteins, vaccines and diagnostic products for effective treatment of diseases.

Table continued on next page..

Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
23	Pacific Magtron International Corp.	11-May-2005	This company manufactures pharmaceutical products.
24	Sheffield Pharmaceuticals Inc.	6-Jun-2003	Sheffield Pharmaceuticals, Inc. provides innovative, cost-effective pharmaceutical therapies by combining state-of-the-art pulmonary drug delivery technologies with existing and emerging therapeutic agents.
25	Fibrocell Science, Inc.	15-Jun-2009	Fibrocell Science Inc. is an autologous cellular therapeutic company focused on the development of innovative products for aesthetic, medical and scientific applications.
26	Orchestra Therapeutics, Inc.	13-Oct-2008	Orchestra Therapeutics Inc., formerly The Immune Response Corporation (OTC Bulletin Board: OCHT, formerly IMRP), is an immuno-pharmaceutical company focused on the discovery and development of novel treatments for autoimmune diseases.
27	W.R. Grace & Co.	2-Apr-2001	Grace is the worldwide leader in fluid catalytic cracking catalysts.
28	International BioChemical Industries Inc.	17-Jan-2004	This company is focused in biotechnology and antimicrobial products.

Table continued on next page..

Serial Number	Company Name	Bankruptcy announced on	Brief description about the company
30	Immunicon Corp.	11-Jun-2008	Immunicon makes equipment designed to identify and analyze certain cells in blood samples, such as loose tumor cells. The company develops cell-based diagnostic and research technologies with a primary focus on the diagnosis, treatment and monitoring of cancer.
31	Antex Biologics Inc.	27-Mar-2003	Antex Biologics is a biopharmaceutical company that manufactures products for treatment of infections.
32	Anpath Group, Inc.	20-May-2010	This company produces cleaning and disinfecting products that it believes will help prevent the spread of infectious microorganisms while minimizing the harmful effects to people, equipment or the environment.
33	Altus Pharmaceuticals, Inc.	11-Nov-2009	Altus Pharmaceuticals is a development stage biopharmaceutical company focused on the development and commercialization of oral and injectable protein therapeutics for gastrointestinal and metabolic disorders.
34	Accentia Biopharmaceuticals, Inc.	10-Nov-2008	This company is committed to advancing the autoimmune disease therapy.
35	Tronox, Inc.	12-Jan-2009	Tronox is a company focused on the production and marketing of titanium products.
36	Alderox, Inc.	7-Dec-2009	Alderox Inc. is a world leader in productivity enhancing, environmentally friendly anti-stick release agents and lubricants to the mining sector.

REFERENCES

Adizes I. 1979. Organizational passages—Diagnosing and treating lifecycle problems of organizations. *Organizational Dynamics* **8** (1): 3-25.

Adler PS, Goldoftas B, Levine DI. 1999. Flexibility versus Efficiency? A Case Study of Model Changeovers in the Toyota Production System. *Organization Science* **10** (1): 43-68.

Aime F, Johnson S, Ridge JW, Hill AD. 2010. The routine may be stable but the advantage is not: competitive implications of key employee mobility. *Strategic Management Journal* **31** (1): 75-87.

Alchian AA. 1950. Uncertainty, Evolution, and Economic Theory. *The Journal of Political Economy* **58** (3): 211-221.

Allarakhia M, Walsh S. 2011. Managing knowledge assets under conditions of radical change: The case of the pharmaceutical industry. *Technovation* **31** (2–3): 105-117.

Allison PD. 1995. *Survival analysis using SAS®: A practical guide.* SAS Publishing: Cary, NC.

Almeida H, Campello M, Weisbach MS. 2004. The Cash Flow Sensitivity of Cash. *The Journal of Finance* **59** (4): 1777-1804.

Altman EI, Hotchkiss E. 2006. *Corporate financial distress and bankruptcy: predict and avoid bankruptcy, analyze and invest in distressed debt.* Wiley: Hoboken, N.J.

Altman EI. 1968. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance* **23** (4): 589-609.

Altman EI. 1984. A Further Empirical Investigation of the Bankruptcy Cost Question. *The Journal of Finance* **39** (4): 1067-1089.

Anand G, Gray J, Siemsen E. 2012. Decay, Shock, and Renewal: Operational Routines and Process Entropy in the Pharmaceutical Industry. *Organization Science* **23** (6): 1700-1716.

Antle R, Fellingham J. 1990. Resource Rationing and Organizational Slack in a Two-Period Model. *Journal of Accounting Research* **28** (1): 1-24.

Argenti J. 1976. *Corporate collapse: the causes and symptoms.* Wiley: New York.

Arogyaswamy K, Yasai-Ardekani M. 1997. Organizational turnaround: understanding the role of cutbacks, efficiency improvements, and investment in technology. *IEEE Transactions on Engineering Management* **44** (1): 3-11.

Athreye S, Godley A. 2009. Internationalization and technology leapfrogging in the pharmaceutical industry. *Industrial and Corporate Change* **18** (2): 295-323.

Audia PG, Greve HR. 2006. Less Likely to Fail: Low Performance, Firm Size, and Factory Expansion in the Shipbuilding Industry. *Management Science* **52** (1): 83-94.

Audia PG, Locke EA, Smith KG. 2000. The Paradox of Success: An Archival and a Laboratory Study of Strategic Persistence Following Radical Environmental Change. *The Academy of Management Journal* **43** (5): 837-853.

Bailey D, Kobayashi S, MacNeill S. 2008. Rover and out? Globalisation, the West Midlands auto cluster, and the end of MG Rover. *Policy Studies* **29** (3): 267-279.

Balcaen S, Manigart S, Ooghe H. 2011. From distress to exit: determinants of the time to exit. *Journal of Evolutionary Economics* **21** (3): 407-446.

Barker III VL, Duhaime IM. 1997. Strategic Change in the Turnaround Process: Theory and Empirical Evidence. *Strategic Management Journal* **18** (1): 13-38.

Barker III VL, Mone MA. 1994. Retrenchment: Cause of Turnaround or Consequence of Decline? *Strategic Management Journal* **15** (5): 395-405.

Barley SR. 2006. When I Write My Masterpiece: Thoughts on What Makes a Paper Interesting. *The Academy of Management Journal* **49** (1): 16-20.

Barnard CI. 1938. *The functions of the executive.* Harvard University Press: Cambridge, Mass.

Beaver WH. 1966. Financial Ratios As Predictors of Failure. *Journal of Accounting Research* **4** (, Empirical Research in Accounting: Selected Studies 1966): 71-111.

Becker MC, Lazaric N, Nelson RR, Winter SG. 2005. Applying organizational routines in understanding organizational change. *Industrial and Corporate Change* **14** (5): 775-791.

Becker MC. 2005a. A framework for applying organizational routines in empirical research: linking antecedents, characteristics and performance outcomes of recurrent interaction patterns. *Industrial and Corporate Change* **14** (5): 817-846.

Becker MC. 2005b. The concept of routines: some clarifications. *Cambridge Journal of Economics* **29** (2): 249-262.

Behn RD. 1988. The fundamentals of cutback management. In *Readings in Organizational decline Frameworks Research and Prescriptions,* Cameron K, Sutton R and Whetten D (eds). Ballinger Publishing Company: USA; 347-356.

Bergh DD, Lawless MW. 1998. Portfolio Restructuring and Limits to Hierarchical Governance: The Effects of Environmental Uncertainty and Diversification Strategy. *Organization Science* **9** (1): 87-102.

Berk RA. 1983. An Introduction to Sample Selection Bias in Sociological Data. *American Sociological Review* **48** (3): 386-398.

Betsch TT, Fiedler K, Brinkmann J. 1998. Behavioral routines in decision making: the effects of novelty in task presentation and time pressure on routine maintenance and deviation. *European Journal of Social Psychology* **28** (6): 861-878.

Bibeault DB. 1982. *Corporate turnaround: how managers turn losers into winners.* McGraw-Hill: New York.

Boeker W, Goodstein J. 1991. Organizational Performance and Adaptation: Effects of Environment and Performance on Changes in Board Composition. *The Academy of Management Journal* **34** (4): 805-826.

Boeker W. 1997. Strategic Change: The Influence of Managerial Characteristics and Organizational Growth. *The Academy of Management Journal* **40** (1): 152-170.

Bolton MK. 1993. Organizational Innovation and Substandard Performance: When Is Necessity the Mother of Innovation? *Organization Science* **4** (1, Focused Issue: Organizational Decline and Adaptation: Theoretical Controversies): 57-75.

Bourgeois III LJ, Singh JV. 1983. Organizational Slack and Political Behavior Among Top Management Teams. *Academy of Management Proceedings (00650668)*: 43-47.

Bourgeois III LJ. 1981. On the Measurement of Organizational Slack. *The Academy of Management Review* **6** (1): 29-39.

Bowman EH. 1982. Risk seeking by troubled firms. *Sloan Management Review* **23** (4): 33-42.

Bozeman B, Slusher EA. 1979. Scarcity and Environmental Stress in Public organizations. *Administration & Society* **11** (3): 335-355.

Bromiley P. 1991. Testing a Causal Model of Corporate Risk Taking and Performance. *The Academy of Management Journal* **34** (1): 37-59.

Brush TH, Bromiley P, Hendrickx M. 2000. The Free Cash Flow Hypothesis for Sales Growth and Firm Performance. *Strategic Management Journal* **21** (4): 455-472.

Bruton GD, Ahlstrom D, Wan JCC. 2003. Turnaround in East Asian Firms: Evidence from Ethnic Overseas Chinese Communities. *Strategic Management Journal* **24** (6): 519-540.

Bruton GD, Oviatt BM, White MA. 1994. Performance of Acquisitions of Distressed Firms. *The Academy of Management Journal* **37** (4): 972-989.

Cameron CA, Trivedi PK. 1998. *Regression analysis of count data.* Cambridge University Press: New York.

Cameron K, Zammuto R. 1983. Matching Managerial Strategies to Conditions of Decline. *Human Resource Management* **22** (4): 359-375.

Cameron K. 1983. Strategic Responses to Conditions of Decline: Higher Education and the Private Sector. *The Journal of Higher Education* **54** (4): 359-380.

Cameron KS, Kim MU, Whetten DA. 1987. Organizational Effects of Decline and Turbulence. *Administrative Science Quarterly* **32** (2): 222-240.

Cameron KS, Sutton RI, Whetten DA. 1988. *Readings in organizational decline: frameworks, research, and prescriptions.* Ballinger Pub. Co.: Boston, Mass.

Cameron KS, Whetten DA, Kim MU. 1987. Organizational Dysfunctions of Decline. *The Academy of Management Journal* **30** (1): 126-138.

Castrogiovanni GJ, Baliga BR, Kidwell Jr RE. 1992. Curing Sick Businesses: Changing CEOs in Turnaround Efforts. *The Executive* **6** (3): 26-41.

Chattopadhyay P, Glick WH, Huber GP. 2001. Organizational Actions in Response to Threats and Opportunities. *The Academy of Management Journal* **44** (5): 937-955.

Chen M, Hambrick DC. 1995. Speed, Stealth, and Selective Attack: How Small Firms Differ from Large Firms in Competitive Behavior. *The Academy of Management Journal* **38** (2): 453-482.

Chen W, Miller KD. 2007. Situational and Institutional Determinants of Firms' R&D Search Intensity. *Strategic Management Journal* **28** (4): 369-381.

Chen W. 2008. Determinants of Firms' Backward- and Forward-Looking R&D Search Behavior. *Organization Science* **19** (4): 609-622.

Cheng JLC, Kesner IF. 1997. Organizational Slack and Response to Environmental Shifts: The Impact of Resource Allocation Patterns. *Journal of Management* **23** (1): 1-18.

Chowdhury SD, Lang JR. 1996. Turnaround in small firms: An assessment of efficiency strategies. *Journal of Business Research* **36** (2): 169-178.

Cohen MD, Bacdayan P. 1994. Organizational Routines Are Stored As Procedural Memory: Evidence from a Laboratory Study. *Organization Science* **5** (4): 554-568.

Cohen MD, Burkhart R, Dosi G, Egidi M, Marengo L, Warglien M, Winter S. 1996. Routines and Other Recurring Action Patterns of Organizations: Contemporary Research Issues. *Industrial and Corporate Change* **5** (3): 653-698.

Cohen MD, March JG, Olsen JP. 1972. A Garbage Can Model of Organizational Choice. *Administrative Science Quarterly* **17** (1): 1-25.

Cohen WM, Levinthal DA. 1989. Innovation and Learning: The Two Faces of R&D. *The Economic Journal* **99** (397): 569-596.

Cohendet P, Llerena P. 2003. Routines and incentives: the role of communities in the firm. *Industrial and Corporate Change* **12** (2): 271-297.

Combs JG, Ketchen DJ Jr. 1999. Can Capital Scarcity Help Agency Theory Explain Franchising? Revisiting the Capital Scarcity Hypothesis. *The Academy of Management Journal* **42** (2): 196-207.

Cummings LL. 1988. Organizational decline from the individual perspective. In *Readings in organizational decline: frameworks, research, and prescriptions,* Cameron KS, Sutton RI and Whetten DA (eds). Ballinger Publishing Company: Boston, Massachusetts; 417-424.

Cummings TG, Blumenthal JF, Greiner LE. 1983. Managing Organizational Decline: The Case for Transorganizational Systems. *Human Resource Management* **22** (4): 377-390.

Cyert RM, March JG. 1963. *A behavioral theory of the firm.* Prentice-Hall: Englewood Cliffs, N.J.

Cyert RM. 1978. The Management of Universities of Constant or Decreasing Size. *Public Administration Review* **38** (4): 344-349.

Czarnitzki D, Hussinger K, Schneider C. 2011. Commercializing academic research: the quality of faculty patenting. *Industrial and Corporate Change* **20** (5): 1403-1437.

Daily CM, Dalton DR. 1994a. Bankruptcy and Corporate Governance: The Impact of Board Composition and Structure. *The Academy of Management Journal* **37** (6): 1603-1617.

Daily CM, Dalton DR. 1994b. Corporate Governance and the Bankrupt Firm: An Empirical Assessment. *Strategic Management Journal* **15** (8): 643-654.

Daily CM, Dalton DR. 1995. CEO and Director Turnover in Failing Firms: An Illusion of Change? *Strategic Management Journal* **16** (5): 393-400.

Daily CM. 1994. Bankruptcy in Strategic Studies: Past and promise. *Journal of Management* **20** (2): 263-295.

Daily CM. 1995. The Relationship Between Board Composition and Leadership Structure and Bankruptcy Reorganization Outcomes. *Journal of Management* **21** (6): 1041-1056.

Daily CM. 1996. Governance patterns in bankruptcy reorganizations. *Strategic Management Journal* **17** (5): 355-375.

D'Aunno T, Sutton RI. 1992. The Responses of Drug Abuse Treatment Organizations to Financial Adversity: A Partial Test of the Threat-Rigidity Thesis. *Journal of Management* **18** (1): 117-131.

D'Aveni RA, MacMillan IC. 1990. Crisis and the content of managerial communications: A study of the focus of attention of top managers in surviving and failing firms. *Administrative Science Quarterly* **35** (4): 634-657.

D'Aveni RA. 1989a. The Aftermath of Organizational Decline: A Longitudinal Study of the Strategic and Managerial Characteristics of Declining Firms. *The Academy of Management Journal* **32** (3): 577-605.

D'Aveni RA. 1989b. Dependability and Organizational Bankruptcy: An Application of Agency and Prospect Theory. *Management Science* **35** (9): 1120-1138.

D'Aveni RA. 1990. Top Managerial Prestige and Organizational Bankruptcy. *Organization Science* **1** (2): 121-142.

Davidson III WN, Worrell DL, Dutia D. 1993. The Stock Market Effects of CEO Succession in Bankrupt Firms. *Journal of Management* **19** (3): 517.

de Leeuw S, van den Berg JP. 2011. Improving operational performance by influencing shopfloor behavior via performance management practices. *Journal of Operations Management* **29** (3): 224-235.

Delaney KJ. 1992. *Strategic bankruptcy: how corporations and creditors use Chapter 11 to their advantage.* University of California Press: Berkeley.

Denrell J, March JG. 2001. Adaptation as Information Restriction: The Hot Stove Effect. *Organization Science* **12** (5): 523-538.

Devinney TM. 2013. Is Microfoundational Thinking Critical to Management Thought and Practice? *The Academy of Management Perspectives* **27** (2): 81-84.

Donoher WJ. 2004. To File Or Not To File? Systemic Incentives, Corporate Control, and the Bankruptcy Decision. *Journal of Management* **30** (2): 239-262.

Dosi G, Faillo M, Marengo L. 2008. Problem solving and governance in the capability-based view of the firm: the roles and theoretical representations of organizational routines. In *Handbook of Organizational Routines,* Becker MC (ed). Edward Elgar Publishing Limited: Cheltenham, UK; 107-124.

Dosi G, Teece DJ, Winter SG. 1992. Toward a theory of corporate coherence: Preliminary remarks. In *Technology and enterprise in a historical perspective*, Dosi G, Giannetti R, Toninelli PM (ed). Clarendon Press; Oxford University Press: Oxford; New York; 185-211.

Dowell GWS, Shackell MB, Stuart NV. 2011. Boards, CEOs, and surviving a financial crisis: Evidence from the internet shakeout. *Strategic Management Journal* **32** (10): 1025-1045.

Edmondson AC, Bohmer RM, Pisano GP. 2001. Disrupted Routines: Team Learning and New Technology Implementation in Hospitals. *Administrative Science Quarterly* **46** (4): 685-716.

Epple D, Argote L, Devadas R. 1991. Organizational Learning Curves: A Method for Investigating Intra-Plant Transfer of Knowledge Acquired Through Learning by Doing. *Organization Science* **2** (1, Special Issue: Organizational Learning: Papers in Honor of (and by) James G. March): 58-70.

Eroglu C, Hofer C. 2011. Lean, leaner, too lean? The inventory-performance link revisited. *Journal of Operations Management* **29** (4): 356-369.

Evans JD, Green CL. 2000. Marketing Strategy, Constituent Influence, and Resource Allocation: An Application of the Miles and Snow Typology to Closely Held Firms in Chapter 11 Bankruptcy. *Journal of Business Research* **50** (2): 225-231.

Feldman MS, Pentland BT. 2003. Reconceptualizing Organizational Routines as a Source of Flexibility and Change. *Administrative Science Quarterly* **48** (1): 94-118.

Feldman MS. 2000. Organizational Routines as a Source of Continuous Change. *Organization Science* **11** (6): 611-629.

Feldman MS. 2003. A performative perspective on stability and change in organizational routines. *Industrial and Corporate Change* **12** (4): 727-752.

Felin T, Foss NJ. 2011. The endogenous origins of experience, routines, and organizational capabilities: the poverty of stimulus. *Journal of Institutional Economics* **7** (Special issue 02): 231-256.

Fisher G, Lee J, Johns L. 2004. An Exploratory Study of Company Turnaround in Australia and Singapore Following the Asia Crisis. *Asia Pacific Journal of Management* **21** (1): 149-170.

Fleming L, Sorenson O. 2004. Science as a map in technological search. *Strategic Management Journal* **25** (8-9): 909-928.

Fleming L. 2001. Recombinant Uncertainty in Technological Search. *Management Science* **47** (1): 117-132.

Flynn DM, Farid M. 1991. The Intentional Use of Chapter XI: Lingering Versus Immediate Filing. *Strategic Management Journal* **12** (1): 63-74.

Ford JD. 1980a. The Administrative Component in Growing and Declining Organizations: A Longitudinal Analysis. *The Academy of Management Journal* **23** (4): 615-630.

Ford JD. 1980b. The Occurrence of Structural Hysteresis in Declining Organizations. *The Academy of Management Review* **5** (4): 589-598.

Francis JD, Desai AB. 2005. Situational and organizational determinants of turnaround. *Management Decision* **43** (9): 1203-1224.

Furrer O, Pandian JR, Thomas H. 2007. Corporate strategy and shareholder value during decline and turnaround. *Management Decision* **45** (3): 372-392.

Gavetti G, Levinthal DA. 2000. Looking Forward and Looking Backward: Cognitive and Experiential Search. *Administrative Science Quarterly* **45** (1): 113-137.

Geiger SW, Cashen LH. 2002. A multidimensional examination of slack and its impact on innovation. *Journal of Managerial Issues* **14** (1): 68-84.

Gersick CJG, Hackman JR. 1990. Habitual routines in task-performing groups. *Organizational Behavior and Human Decision Processes* **47** (1): 65-97.

Gersick CJG. 1989. Marking Time: Predictable Transitions in Task Groups. *The Academy of Management Journal* **32** (2): 274-309.

Gilbert C. 2005. Unbundling the Structure of Inertia: Resource Versus Routine Rigidity. *The Academy of Management Journal* **48** (5): 741-763.

Gilmore T, Hirschhorn L. 1983. Management Challenges under Conditions of Retrenchment. *Human Resource Management* **22** (4): 341-357.

Grant RM. 1996. Toward a Knowledge-Based Theory of the Firm. *Strategic Management Journal* **17** (, Special Issue: Knowledge and the Firm): 109-122.

Greenhalgh L, Rosenblatt Z. 1984. Job Insecurity: Toward Conceptual Clarity. *The Academy of Management Review* **9** (3): 438-448.

Greenhalgh L. 1983. Managing the Job Insecurity Crisis. *Human Resource Management* **22** (4): 431-444.

Greve HR. 2003. A Behavioral Theory of R&D Expenditures and Innovations: Evidence from Shipbuilding. *The Academy of Management Journal* **46** (6): 685-702.

Greve HR. 2008. Organizational routines and performance feedback. In *Handbook of organizational routines,* Becker MC (ed). Edward Elgar Publishing Limited: Cheltenham, UK; 187-204.

Greve HR. 2011. Positional rigidity: low performance and resource acquisition in large and small firms. *Strategic Management Journal* **32** (1): 103-114.

Hadlock CJ, Pierce JR. 2010. New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. *Review of Financial Studies* **23** (5): 1909-1940.

Hambrick DC, D'Aveni RA. 1988. Large Corporate Failures as Downward Spirals. *Administrative Science Quarterly* **33** (1): 1-23.

Hambrick DC, D'Aveni RA. 1992. Top Team Deterioration As Part of the Downward Spiral of Large Corporate Bankruptcies. *Management Science* **38** (10): 1445-1466.

Hambrick DC, Schecter SM. 1983. Turnaround strategies for mature industrial-product business units. *The Academy of Management Journal* **26** (2): 231-248.

Hannan MT, Freeman J. 1984. Structural inertia and organizational change. *American Sociological Review* **49** (2): 149-164.

Hardy C. 1988. Investing in retrenchement:Avoiding the hidden costs. In *Readings in Organizational decline Frameworks Research and Prescriptions,* Cameron K, Sutton R and Whetten D (eds). Ballinger Publishing Company: USA; 369-380.

Hardy C. 1990. 'Hard' Decisions and 'Tough' Choices: The Business Approach to University Decline. *Higher Education* **20** (3): 301-321.

Hausman J, Hall BH, Griliches Z. 1984. Econometric models for count data with an application to the patents-R&D relationship. *Econometrica* **52**: 909-938.

Haveman HA. 1993. Ghosts of Managers Past: Managerial Succession and Organizational Mortality. *The Academy of Management Journal* **36** (4): 864-881.

Helfat CE. 1994. Evolutionary trajectories in petroleum firm R&D. *Management Science* **40** (12): 1720-1747.

Hendricks KB, Singhal VR, Zhang R. 2009. The effect of operational slack, diversification, and vertical relatedness on the stock market reaction to supply chain disruptions. *Journal of Operations Management* **27** (3): 233-246.

Hoang H, Rothaermel FT. 2010. Leveraging internal and external experience: exploration, exploitation, and R&D project performance. *Strategic Management Journal* **31** (7): 734-758.

Hodgson GM, Knudsen T. 2010. *Darwin's conjecture: the search for general principles of social and economic evolution.* University of Chicago Press: Chicago.

Hodgson GM. 2003. The Mystery of the Routine: The Darwinian Destiny of An Evolutionary Theory of Economic Change. *Revue économique* **54** (2): 355-384.

Hodgson GM. 2009. The nature and replication of routines. In *Organizational routines: Advancing empirical research,* Becker MC and Lazaric N (eds). Edward Elgar: Cheltenham,UK; Northampton,MA; 26-46.

Hoskisson RE, Hitt MA. 1990. Antecedents and Performance Outcomes of Diversification: A Review and Critique of Theoretical Perspectives. *Journal of Management* **16** (2): 461-509.

Howard-Grenville JA. 2005. The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context. *Organization Science* **16** (6): 618-636.

Hundley G, Jacobson CK, Park SH. 1996. Effects of Profitability and Liquidity on R&D Intensity: Japanese and U.S. Companies Compared. *The Academy of Management Journal* **39** (6): 1659-1674.

Iyer DN, Miller KD. 2008. Performance Feedback, Slack, and the Timing of Acquisitions. *The Academy of Management Journal* **51** (4): 808-822.

Jacob WF, Kwak YH. 2003. In search of innovative techniques to evaluate pharmaceutical R&D projects. *Technovation* **23** (4): 291-296.

Jensen MC, Meckling WH. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* **3** (4): 305-360.

Jensen MC. 1986. Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *The American Economic Review* **76** (2, Papers and Proceedings of the Ninety-Eighth Annual Meeting of the American Economic Association): 323-329.

Johnson RA. 1996. Antecedents and Outcomes of Corporate Refocusing. *Journal of Management* **22** (3): 439-483.

Kahneman D, Tversky A. 1979. Prospect Theory: An Analysis of Decision under Risk. *Econometrica* **47** (2): 263-292.

Kaplan SN, Zingales L. 1997. Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? *The Quarterly Journal of Economics* **112** (1): 169-215.

Katila R. 2002. New Product Search over Time: Past Ideas in Their Prime? *The Academy of Management Journal* **45** (5): 995-1010.

Kelly JR, McGrath JE. 1985. Effects of time limits and task types on task performance and interaction of four-person groups. *Journal of Personality and Social Psychology* **49** (2): 395-407.

Ketchen Jr. DJ, Palmer TB. 1999. Strategic responses to poor organizational performance: a test of competing perspectives. *Journal of Management* **25** (5): 683-706.

Khanna N, Poulsen AB. 1995. Managers of Financially Distressed Firms: Villains or Scapegoats? *The Journal of Finance* **50** (3, Papers and Proceedings Fifty-Fifth Annual Meeting, American Finance Association, Washington, D.C., January 6-8, 1995): 919-940.

Kleindorfer PR, Saad GH. 2005. Managing Disruption Risks in Supply Chains. *Production and Operations Management* **14** (1): 53-68.

Knudsen T, Levinthal DA. 2007. Two Faces of Search: Alternative Generation and Alternative Evaluation. *Organization Science* **18** (1): 39-54.

Knudsen T. 2008. Organizational routines in evolutionary theory. In *Handbook of Organizational Routines,* Becker MC (ed). Edward Elgar Publishing Limited: Cheltenham, UK; 125-151.

Koberg CS. 1987. Resource Scarcity, Environmental Uncertainty, and Adaptive Organizational Behavior. *The Academy of Management Journal* **30** (4): 798-807.

Krantz J. 1985. Group Process Under Conditions of Organizational Decline. *The Journal of Applied Behavioral Science* **21** (1): 1-17.

LaMattina JL. 2009. *Drug truths: dispelling the myths about pharma R&D.* John Wiley & Sons: Hoboken, N.J.

Lant TK, Mezias SJ. 1992. An Organizational Learning Model of Convergence and Reorientation. *Organization Science* **3** (1): 47-71.

Lant TK, Milliken FJ, Batra B. 1992. The role of managerial learning and interpretation in strategic persistence and reorientation: An empirical exploration. *Strategic Management Journal* **13** (8): 585-608.

Latham SF, Braun M. 2009. Managerial Risk, Innovation, and Organizational Decline. *Journal of Management* **35** (2): 258-281.

Latham SF, Braun MR. 2008. The Performance Implications of Financial Slack during Economic Recession and Recovery: Observations from the Software Industry (2001-2003). *Journal of Managerial Issues* **20** (1): 30-50.

Lazaric N, Raybaut A. 2005. Knowledge, hierarchy and the selection of routines: an interpretative model with group interactions. *Journal of Evolutionary Economics* **15** (4): 393-421.

Lehman DW, Hahn J, Ramanujam R, Alge BJ. 2011. The Dynamics of the Performance–Risk Relationship Within a Performance Period: The Moderating Role of Deadline Proximity. *Organization Science* **22** (6): 1613-1630.

Leiponen A. 2012. The benefits of R&D and breadth in innovation strategies: a comparison of Finnish service and manufacturing firms. *Industrial and Corporate Change* **21** (5): 1255-1281.

Levine CH. 1978. Organizational Decline and Cutback Management. *Public Administration Review* **38** (4): 316-325.

Levine CH. 1979. More on Cutback Management: Hard Questions for Hard Times. *Public Administration Review* **39** (2): 179-183.

Levine CH. 1985. Police Management in the 1980s: From Decrementalism to Strategic Thinking. *Public Administration Review* **45** (, Special Issue: Law and Public Affairs): 691-700.

Levinthal D, March JG. 1981. A model of adaptive organizational search. *Journal of Economic Behavior & Organization* **2** (4): 307-333.

Levitt B, March JG. 1988. Organizational Learning. *Annual Reviews in Sociology* **14** (1): 319-338.

Levy A. 1986. Second-Order Planned Change: Definition and Conceptualization. *Organizational Dynamics* **15** (1): 5-23.

Lewin AY, Massini S, Peeters C. 2011. Microfoundations of internal and external absorptive capacity routines. *Organization Science* **22** (1): 81-98.

Loch CH, Sengupta K, Ahmad MG. 2013. The Microevolution of Routines: How Problem Solving and Social Preferences Interact. *Organization Science* **24**(1): 99-115.

Love G, Nohria N. 2005. Reducing slack: the performance consequences of downsizing by large industrial firms, 1977-93. *Strategic Management Journal* **26** (12): 1087-1108.

Ludwig DC. 1993. Adapting to a Declining Environment: Lessons from a Religious Order. *Organization Science* **4** (1, Focused Issue: Organizational Decline and Adaptation: Theoretical Controversies): 41-56.

Majumdar SK, Venkataraman S. 1993. New technology adoption in US telecommunications: The role of competitive pressures and firm-level inducements. *Research Policy* **22** (5–6): 521-536.

Makridakis S. 1991. What can we learn from corporate failure? *Long Range Planning* **24** (4): 115-126.

Manns CL, March JG. 1978. Financial Adversity, Internal Competition, and Curriculum Change in a University. *Administrative Science Quarterly* **23** (4): 541-552.

March JG, Simon H. 1958. *Organizations.* Wiley: New York.

March JG. 1981. Footnotes to Organizational Change. *Administrative Science Quarterly* **26** (4): 563-577.

March JG. 1988. Variable risk preferences and adaptive aspirations. *Journal of Economic Behavior & Organization* **9** (1): 5-24.

March JG. 1991. Exploration and exploitation in organizational learning. *Organization Science* **2** (1): 71-87.

March JG. 1994. The evolution of evolution. In *Evolutionary dynamics of organizations,* Singh JV and Baum JAC (eds). Oxford University Press: New York; 39-52.

Martinez RJ, Artz KW. 2006. An examination of firm slack and risk-taking in regulated and deregulated airlines. *Journal of Managerial Issues* **18** (1): 11-31.

Masuch M. 1985. Vicious Circles in Organizations. *Administrative Science Quarterly* **30** (1): 14-33.

McKinley W, Cheng JLC, Schick AG. 1986. Perceptions of Resource Criticality in Times of Resource Scarcity: The Case of University Departments. *The Academy of Management Journal* **29** (3): 623-632.

McKinley W. 1987. Complexity and Administrative Intensity: The Case of Declining Organizations. *Administrative Science Quarterly* **32** (1): 87-105.

McKinley W. 1993. Organizational Decline and Adaptation: Theoretical Controversies. *Organization Science* **4** (1, Focused Issue: Organizational Decline and Adaptation: Theoretical Controversies): 1-9.

Meyer A. 1988. Organizational decline from the organizational perspective. In *Readings in organizational decline: frameworks, research, and prescriptions,* Cameron KS, Sutton RI and Whetten DA (eds). Ballinger Pub. Co.: Boston, Mass.; 411-416.

Meyer MW, Zucker LG. 1989. *Permanently failing organizations.* Sage Publications: Newbury Park, Calif.

Miles RE, Snow CC. 1994. *Fit, failure, and the hall of fame: how companies succeed or fail.* Free Press: New York.

Miller D, Chen MJ. 1994. Sources and consequences of competitive inertia: A study of the US airline industry. *Administrative Science Quarterly* **39** (1): 1-23.

Miller D, Friesen PH. 1977. Strategy-Making in Context: Ten Empirical Archetypes. *Journal of Management Studies* **14** (3): 253-280.

Miller D, Friesen PH. 1983. Successful and Unsuccessful Phases of the Corporate Life Cycle. *Organization Studies* **4** (4): 339-356.

Miller D, Lant TK, Milliken FJ, Korn HJ. 1996. The evolution of strategic simplicity: Exploring two models of organizational adaption. *Journal of Management* **22** (6): 863-887.

Miller D. 1977. Common syndromes of business failure. *Business Horizons* **20** (6): 43-53.

Miller KD, Arikan AT. 2004. Technology Search Investments: Evolutionary, Option Reasoning, and Option Pricing Approaches. *Strategic Management Journal* **25** (5): 473-485.

Mintzberg H. 1984. Power and Organization Life Cycles. *The Academy of Management Review* **9** (2): 207-224.

Mohrman SA, Worley CG. 2009. Dealing with rough times: a capabilities development approach to surviving and thriving. *Human Resource Management* **48** (3): 433-445.

Mone MA, McKinley W, Barker VL, III. 1998. Organizational Decline and Innovation: A Contingency Framework. *The Academy of Management Review* **23** (1): 115-132.

Morrow JL, Sirmon DG, Hitt MA, Holcomb TR. 2007. Creating value in the face of declining performance: firm strategies and organizational recovery. *Strategic Management Journal* **28** (3): 271-283.

Moulton WN, Thomas H, Pruett M. 1996. Business Failure Pathways: Environmental Stress and Organizational Response. *Journal of Management* **22** (4): 571-595.

Moulton WN, Thomas H. 1993. Bankruptcy as a Deliberate Strategy: Theoretical Considerations and Empirical Evidence. *Strategic Management Journal* **14** (2): 125-135.

Musso P, Schiavo S. 2008. The impact of financial constraints on firm survival and growth. *Journal of Evolutionary Economics* **18** (2): 135-149.

Narduzzo A, Rocco E, Warglien M. 2000. Talking about routines in the field: The emergence of organizational capabilities in a new cellular phone network company. In *The nature and dynamics of organizational capabilities,* Dosi G, Nelson RR and Winter SG (eds). Oxford University Press: Oxford; New York; Chapter 1.

Narduzzo A, Warglien M. 2008. Conducting experimental research on organizational routines. In *Handbook of Organizational Routines,* Becker MC (ed). Edward Elgar Publishing Limited: Cheltenham, UK; 301-324.

Nassimbeni G. 2003. Local manufacturing systems and global economy: are they compatible?: The case of the Italian eyewear district. *Journal of Operations Management* **21** (2): 151-171.

Nelson PB. 1981. *Corporations in crisis: behavioral observations for bankruptcy policy.* Praeger: New York.

Nelson RR, Winter SG. 1982. *An Evolutionary Theory of Economic Change.* Harvard University Press: Cambridge, Mass.

Nelson RR. 2009. Routines as technologies and as organizational capabilities. In *Organizational routines: advancing empirical research,* Becker M and Lazaric N (eds). Edward Elgar: Cheltenham, UK; Northampton, MA; Chapter 2.

Nohria N, Gulati R. 1995. What is the Optimum Amount of Organizational Slack? A Study of the Relationship between Slack and Innovation in Multinational Firms. *Academy of Management Best Papers Proceedings*: 32-36.

Nohria N, Gulati R. 1996. Is Slack Good or Bad for Innovation? *The Academy of Management Journal* **39** (5): 1245-1264.

Nystrom PPC, Starbuck W. 1984. To avoid organizational crises, unlearn. *Organizational Dynamics* **12** (4): 53-65.

Ocasio W. 1997. Towards an Attention-Based View of the Firm. *Strategic Management Journal* **18** (S1): 187-206.

Ohlson JA. 1980. Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research* **18** (1): 109-131.

O'Neill HM. 1986a. Turnaround and recovery: What strategy do you need? *Long Range Planning* **19** (1): 80-88.

O'Neill HM. 1986b. An Analysis of the Turnaround Strategy in Commercial Banking. *Journal of Management Studies* **23** (2): 165-188.

Pajunen K. 2006. Stakeholder Influences in Organizational Survival. *Journal of Management Studies* **43** (6): 1261-1288.

Pant LW. 1986. The determinants of corporate turnaround. PhD diss. University of Boston: Boston, MA. Accessed through *ProQuest Dissertations and Theses.*

Peng DX, Schroeder RG, Shah R. 2008. Linking routines to operations capabilities: A new perspective. *Journal of Operations Management* **26** (6): 730-748.

Pentland BT, Feldman MS. 2005. Organizational routines as a unit of analysis. *Industrial and Corporate Change* **14** (5): 793-815.

Pentland BT, Rueter HH. 1994. Organizational Routines as Grammars of Action. *Administrative Science Quarterly* **39** (3): 484-510.

Poston KM, Harmon WK, Gramlich J. 1994. A test of financial ratios as predictors of turnaround. *Journal of Applied Business Research* **10** (1): 41-57.

Ramanujam V. 1984. Environmental context, organizational context, strategy and corporate turnaround: an empirical investigation. PhD diss. University of Pittsburgh: Pittsburgh, PA. Accessed through *ProQuest Dissertations and Theses.*

Rerup C, Feldman MS. 2011. Routines as a Source of Change in Organizational Schemata: the Role of Trial-And-Error Learning. *The Academy of Management Journal* **54** (3): 577-610.

Robbins DK, Pearce JA. 1992. Turnaround: Retrenchment and recovery. *Strategic Management Journal* **13** (4): 287-309.

Rosenblatt Z, Rogers KS, Nord WR. 1993. Toward a Political Framework for Flexible Management of Decline. *Organization Science* **4** (1, Focused Issue: Organizational Decline and Adaptation: Theoretical Controversies): 76-91.

Rothaermel FT, Hess AM. 2007. Building dynamic capabilities: Innovation driven by individual-, firm-, and network-level effects. *Organization Science* **18** (6): 898-921.

Rubin IS. 1979. Retrenchment, Loose Structure and Adaptability in the University. *Sociology of Education* **52** (4): 211-222.

Schumpeter JA. 1934. *The theory of economic development; an inquiry into profits, capital, credit, interest, and the business cycle.* Harvard University Press: Cambridge, Mass.

Schumpeter JA. 1942. *Capitalism, socialism, and democracy.* Harper: New York; London.

Shah R, Ward PT. 2003. Lean manufacturing: context, practice bundles, and performance. *Journal of Operations Management* **21** (2): 129-149.

Sheppard JP. 1994. Strategy and Bankruptcy: An Exploration into Organizational Death. *Journal of Management* **20** (4): 795-833.

Singh JV. 1986. Performance, slack, and risk taking in organizational decision making. *The Academy of Management Journal* **29** (3): 562-585.

Smith KG, Grimm CM, Gannon MJ, Chen M. 1991. Organizational Information Processing, Competitive Responses, and Performance in the U.S. Domestic Airline Industry. *The Academy of Management Journal* **34** (1): 60-85.

Smith M, Graves C. 2005. Corporate turnaround and financial distress. *Managerial Auditing Journal* **20** (3): 304-320.

Staw BM, Sandelands LE, Dutton JE. 1981. Threat Rigidity Effects in Organizational Behavior: A Multilevel Analysis. *Administrative Science Quarterly* **26** (4): 501-524.

Strang D, Soule SA. 1998. Diffusion in Organizations and Social Movements: From Hybrid Corn to Poison Pills. *Annual Review of Sociology* **24**: 265-290.

Stuart T, Podolny JM. 1996. Local Search and the Evolution of Technological Capabilities. *Strategic Management Journal* **17** (, Special Issue: Evolutionary Perspectives on Strategy): 21-38.

Sutton RI, Callahan AL. 1987. The Stigma of Bankruptcy: Spoiled Organizational Image and Its Management. *The Academy of Management Journal* **30** (3): 405-436.

Sutton RI, D'Aunno T. 1989. Decreasing Organizational Size: Untangling the Effects of Money and People. *The Academy of Management Review* **14** (2): 194-212.

Sutton RI, Eisenhardt KM, Jucker JV. 1986. Managing Organizational Decline: Lessons from Atari. *Organizational Dynamics* **14** (4): 17-29.

Sutton RI. 1983. Managing organizational death. *Human Resource Management* **22** (4): 391-412.

Sutton RI. 1987. The Process of Organizational Death: Disbanding and Reconnecting. *Administrative Science Quarterly* **32** (4): 542-569.

Szulanski G, Winter S. 2002. Getting It Right the Second Time. *Harvard Business Review* **80** (1): 62-69.

Szulanski G. 1996. Exploring Internal Stickiness: Impediments to the Transfer of Best Practice Within the Firm. *Strategic Management Journal* **17** (, Special Issue: Knowledge and the Firm): 27-43.

Tang CS. 2006. Perspectives in supply chain risk management. *International Journal of Production Economics* **103** (2): 451-488.

Thiétart RA. 1988. Success Strategies for Businesses That Perform Poorly. *Interfaces* **18** (3, Strategic Management): 32-45.

Tripsas M, Gavetti G. 2000. Capabilities, Cognition, and Inertia: Evidence from Digital Imaging. *Strategic Management Journal* **21** (10/11, Special Issue: The Evolution of Firm Capabilities): 1147-1161.

Turner SF, Fern MJ. 2012. Examining the Stability and Variability of Routine Performances: The Effects of Experience and Context Change. *Journal of Management Studies* **49** (8): 1407-1434.

Tversky A, Kahneman D. 1992. Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk & Uncertainty* **5** (4): 297-323.

Upton DM. 1994. The Management of Manufacturing Flexibility. *California Management Review* **36** (2): 72-89.

Voss GB, Sirdeshmukh D, Voss ZG. 2008. The Effects of Slack Resources and Environmental Threat on Product Exploration and Exploitation. *The Academy of Management Journal* **51** (1): 147-164.

Walrave B, van Oorschot KE, Romme AG. 2011. Getting Trapped in the Suppression of Exploration: A Simulation Model. *Journal of Management Studies* **48** (8): 1727-1751.

Weitzel W, Jonsson E. 1989. Decline in Organizations: A Literature Integration and Extension. *Administrative Science Quarterly* **34** (1): 91-109.

Whetten DA. 1980. Organizational decline: A neglected topic in organizational science. *The Academy of Management Review* **5** (4): 577-588.

Whetten DA. 1981. Organizational Responses to Scarcity: Exploring the Obstacles to Innovative Approaches to Retrenchment in Education. *Educational Administration Quarterly* **17** (3): 80-97.

Willard GE, Cooper AC. 1985. Survivors of Industry Shake-Outs: The Case of the U.S. Color Television Set Industry. *Strategic Management Journal* **6** (4): 299-318.

Winter SG, Cattani G, Dorsch A. 2007. The Value of Moderate Obsession: Insights from a New Model of Organizational Search. *Organization Science* **18** (3): 403-419.

Winter SG, Szulanski G, Ringov D, Jensen RJ. 2012. Reproducing Knowledge: Inaccurate Replication and Failure in Franchise Organizations. *Organization Science* **23** (3): 672-685.

Winter SG. 1964. Economic 'Natural Selection' and the Theory of the Firm. *Yale Economic Essays* **Spring** (4): 225-272.

Winter SG. 2003. Understanding Dynamic Capabilities. *Strategic Management Journal* **24** (10, Special Issue: Why Is There a Resource-Based View? Toward a Theory of Competitive Heterogeneity): 991-995.

Winter SG. 2013. Habit, Deliberation, and Action: Strengthening the Microfoundations of Routines and Capabilities. *The Academy of Management Perspectives* **27** (2): 120-137.

Wiseman RM, Bromiley P. 1996. Toward a model of risk in declining organizations: an empirical examination of risk, performance and decline. *Organization Science* **7** (5): 524-543.

Wiseman RM, Catanach AH, Jr. 1997. A Longitudinal Disaggregation of Operational Risk under Changing Regulations: Evidence from the Savings and Loan Industry. *The Academy of Management Journal* **40** (4): 799-830.

Witteloostuijn Av. 1998. Bridging Behavioral and Economic Theories of Decline: Organizational Inertia, Strategic Competition, and Chronic Failure. *Management Science* **44** (4): 501-519.

Woo CY. 1983. Evaluation of the Strategies and Performance of Low ROI Market Share Leaders. *Strategic Management Journal* **4** (2): 123-135.

Wooldridge JM. 2002. *Econometric analysis of cross section and panel data.* MIT Press: Cambridge, Mass.

Woolridge JM. 1997. Quasi-likelihood methods for count data. In *Handbook of applied econometrics, Volume - II, Microeconomics,* Pesaran MH and Schmidt P (eds). Blackwell: Oxford, UK; 352-406.

Woolridge JM. 2006. *Introductory econometrics: a modern approach.* Thomson South-Western: Mason, OH.

Wu GA. 2012. The Effect of Going Public on Innovative Productivity and Exploratory Search. *Organization Science* **23** (4): 928-950.

Zajac EJ, Kraatz MS. 1993. A diametric forces model of strategic change: Assessing the antecedents and consequences of restructuring in the higher education industry. *Strategic Management Journal* **14** (S1): 83-102.

Zbaracki MJ, Bergen M. 2010. When truces collapse: A longitudinal study of price-adjustment routines. *Organization Science* **21** (5): 955-972.

Zimmerman FM. 1989. Managing a successful turnaround. *Long Range Planning* **22** (3): 105-124.

Zmijewski ME. 1984. Methodological Issues Related to the Estimation of Financial Distress Prediction Models. *Journal of Accounting Research* **22** (, Studies on Current Econometric Issues in Accounting Research): 59-82.

Zollo MW, Winter SG. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* **13** (3): 339-351.